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INSTITUTE OF GAS TECHNOLOGY

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1. GAS INDUSTRY

Demand Estimates

Evetts, W. A. ESTIMATING THE GAS DEMAND. *Gas J.* (British) **266**, 239, 244, 248-251 (1951) April 25.

The thoughts and speculations on gas demands developed during the preparation of a comprehensive development plan for the Watford division of the Eastern Gas Board are presented. Various subjects discussed are as follows: increase in population, domestic consumption, maximum week, day, and hours demand, and an analysis of domestic and non-domestic demands.

B. E. Hunt

Gas Heat Survey

AGA RESURVEYS GAS HEAT MARKET. *Gas Heat* **2**, 21 (1951) June.

With the factors of emergency production and distribution caused by the impact of the outbreak in Korea on national economy, the AGA has decided to resume the survey of expected additions of house-heating customers. Despite the possible national shortages and delayed shipments of equipment, the industry has increased its anticipations for the next two heating seasons as compared with the 1950 survey. 919,000 installations are expected for the coming season by 90% of the nation's utilities. Such an increase is credited to natural gas in the Middle Atlantic states.

D. L. Nicol

Industry Expansion

Ely, O. FINANCIAL NEWS AND COMMENT. *Public Utilities Fortn.*, **48**, 112 (1951) July 19.

Under the sub-heading "The Gas Industry's Huge Expansion Program," statistics are given showing the growth of the Industry, which represented a $5 billion investment at the end of World War II, $10 billion in 1951, possibly $15 billion by the close of 1955. Charts show a 120% increase in the quantity (therms) of gas sold during the past decade, while revenue climbed only 100%. About 85% of the Industry expansion has been in the field of natural gas. Transmission and distribution systems now total about 375,000 miles, of which about 255,000 are natural gas transmission lines.

A. E. Neumann

GAMA SURVEY SHOWS GREAT GROWTH OF NATURAL GAS PIPE LINES. *Pipe Line News* **23**, 22, 23 (1951) June.

A natural gas pipe line survey has been made by GAMA covering the period July 1, 1945 to Jan. 1, 1951. Highlights include: 295,000 miles of line in service, including 30,000 miles of field and gathering lines; 29,785 miles of new line authorized by FPC in the period covered; 15,866 miles of new line pending authorization by FPC. Costs and tonnages are given.

J. D. Parent

Mergers

Machold, E. J. PLANNING A MODERN UTILITY MERGER. *Publ. Utilities Fortnightly*, **47**, 747-757 (1951) June 7.

Niagara Mohawk Power Corp., now a single electric and gas operating utility, was originally comprised of seven holding companies and 52 subsidiaries. The manner in which this merger was brought about is reviewed, and the economies thus effected are pointed out.

J. D. Parent

Regulation

Crocker, S. M. NATURAL GAS COMES OF AGE. *Am. Gas J.*, **174**, 17-19, 42-44 (1951) June.

The author reviews the problem of regulation, particularly with respect to fair rates. He feels that, although the natural gas industry is in the soundest financial position of its history, now is the time to improve regulatory procedures and laws. A plea is made for the independent producer. The thought is expressed that it is better to have higher field prices than to have tremendous expansion without due regard for the true economic value.

J. D. Parent

Doerfer, J. C. WHAT A STATE COMMISSION DOES — AND WHY. *Publ. Utilities Fortnightly*, **47**, 771-778 (1951) June 7.

The duties of the Wisconsin Public Service Commission are reviewed. The rights of utilities to fair returns are defended.

J. D. Parent

Randolph, J. P. DOUBLE JURISDICTION IS COSTING UTILITY AND ITS CUSTOMERS MORE THAN $2 MILLION. *Gas*, 27 32-34 (1951) July.

The article opens with a review of the East Ohio Gas Co. case. East Ohio gets its natural gas from other states, but receives it in Ohio and distributes it in Ohio alone. The FPC claimed jurisdiction because the gas is brought over a state line to be distributed by the company. The U.S. Supreme Court supported the FPC. East Ohio had a bookkeeping system approved by the Ohio Public Utilities Commission, but was ordered by the FPC to keep books under a different system. The FPC also ordered an original cost study made, and an original cost inventory of all East Ohio property. Changes and studies have, as of Jan. 31, 1951, cost East Ohio $1,342,000; the job is not yet finished, and company officials estimate it will take another $1 million to complete. Since a utility has no means of paying such expenses except through the rates charged its customers, in the long run East Ohio's customers will pay for compliance with FPC orders. The same problem is faced by 43 other companies over which FPC claims jurisdiction as a result of the East Ohio case. The article closes with suggested support of Senate and House bills to amend the Natural Gas Act, confining it to interstate transportations and leaving interstate distribution in the jurisdiction of the various state commissions.

A. E. Neumann

CLAMP-DOWN ON GAS. *Oil Gas J.*, 50, 62-64 (1951) July 12.

In its application to DPA for fourth quarter allotment of steel for the oil and gas industry, PAD's minimum requirement was cut by 250,000 tons due to certainty that mills could not meet the desired production. Because of line pipe shortage, a tentative order banning acceptance of new customers by natural gas companies has been formulated. It is expected that the order will become effective soon.

J. D. Parent

Safety

Duggan, J. J. DESIGNED FIRE PREVENTION. *Chem. Eng.*, 58, 125-134 (1951) June.

This article consists of a discussion of fire prevention from the standpoints of planning and design, maintenance, and personnel education.

J. J. Guyer

EMPLOYEE ACCIDENTS AT POSTWAR LOW. *Am. Gas Assoc. Monthly*, 33, 7 (1951) May.

Statistics and graphs are given to show that both frequency rates and severity rates of accidents have declined during the past three years.

J. J. Guyer

Utilization Practises

Hess, F. O. NOW IS THE TIME TO OVERHAUL OUR NATURAL GAS UTILIZATION PRACTICES. *Gas*, 27, 39-42 (1951) May.

A warning is sounded to improve the utilization practices of the gas utility industry. Points covered are gas supply and the market, promotion, appliance research, standardized equipment requirements, uniform fuel.

D. L. Nicol

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Gibbon, A. FUNCTIONS OF COMMON CARRIER PIPELINES. p. 150

SENATE GROUP SHELVES BILL ON UNDERGROUND GAS STORAGE. p. 144

2. APPLIANCES

Changeover Guide

Turpish, J. V., Burnett, K. J. and Drake, D. L. GUIDE COVERING CHANGEOVER PRACTICES. *Gas Age*, 107, 51-55, 85, 86 (1951) May 24.

This paper considers solely the customer's service aspects of the conversion from manufactured to natural gas. Several important points, —appliance condemnations, job specifications, refrigerator conversion, water heaters, and burner conversion—are discussed.

B. E. Hunt

Gas Burners

Crosby, J. G. INTERNAL GAS BURNER. U.S. 2,552,845 (1951) May 15.

A burner is described to maintain complete

combustion within the burner head so that the flue gas passing over material to be heated is a neutral atmosphere. The combustion chamber is lined with surface-catalytic material capable of incandescence when heated to produce complete and rapid combustion.

D. L. Nicol

Nissinen, T. A. GAS BURNER, INCLUDING PRIMARY AND SECONDARY AIR PREHEATER. U.S. 2,556,482 (1951) June 12.

A burner is described for which the primary air and secondary air are preheated. The total air supply is forced into a manifold by a blower; a portion of the manifold is placed directly over a series of burner ports to heat the air stream. Secondary air flows from ports on the air manifold to impinge on the burner; the primary portion of the preheated air is mixed with gas and burned at the burner ports. The burner consists of a plurality of cylindrical tips, placed on a pipe manifold. Each port-tip is flattened to a slit to prevent backfire.

D. L. Nicol

Heating Requirements Survey

Signor, C. W. HEAT REQUIREMENTS OF BUILDINGS. *Heating, Piping and Air Conditioning*, 23, 113, 114 (1951) June.

A survey of the heating and process-steam requirement for 24 different types of buildings supplied by steam from a district heating system is presented. The type of usage of the building appears to have a large bearing on consumption figures, ranging from 0.456 lbs. steam/degree day/M cu.ft. of heated space for retail store to 1.15 lbs. steam/degree day /M cu.ft. of heated space for apartments.

D. L. Nicol

Ignition Devices

Hazel, C. S. FLASH TUBE IGNITION HAS ADVANTAGES TO KEEP 'GAS RANGES GAS.' *Am. Gas J.* 174, 23-26 (1951) June.

Automatic single-point gas ignition is discussed with relationship to the automatic ignition of the oven and the broiler. The newest design features of one-bend, two-step systems and two-bend single-step systems are shown. Relative advantages of those ignition devices are discussed in relationship to electric ignition and multi-point gas ignition.

D. L. Nicol

A STUDY OF THERMOCOUPLE TYPE ELEMENTS FOR AUTOMATIC IGNITION SYSTEMS. Research Bull. No. 64, Project DGR-1-WH, Am. Gas Assoc. Labs. (1951) May.

New experimental data are presented which indicate that ordinary variations in ambient temperature and for gas input will not affect lighting of the main burner. Properly applied elements tolerated appreciable variations in input rate without interfering with effective ignition.

D. L. Nicol

Immersion Heater

Smith, F. E. (assigned to E. I. du Pont de Nemours & Co.) IMMERSION HEATER. U.S. 2,556,984 (1951) June 12.

An immersion heater is described for either gas or oil firing. The rate of heat release is controlled over the length of the immersion tube to prevent burn-out of tube walls and to maintain efficient utilization of heat released. The heater consists of three concentric cylinders. The fuel-primary air mixture is burned in the center tube in a downward direction. Secondary air is supplied in the first annulus to start secondary combustion at the bottom of the immersion heater. The products of combustion pass up the second annulus affording a large heat-transfer area before exhaustion of flue products to the stack.

D. L. Nicol

Solid Fuel Appliances

Eaton, F. J. THE RATING OF DOMESTIC SOLID FUEL APPLIANCES. *Gas J.* (British) 266, 873-876, 881, 882, (1951) June 20.

The principles underlying the calculation of the size of appliances necessary for a given heat service are discussed. Accepted rating figures simplify the selection of central heating boilers. The rating of domestic hot water supply boilers is complicated by three widely-varying standards, the lowest of which is recommended by the author. Although there are no accepted ratings for stoves, open fire-places, and back boiler appliances, recommended methods of calculation are given.

W. E. Ball

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution

Munger, H. P. PRESENT STATUS OF AIR-POLLUTION RESEARCH. *Mech. Eng.* 73, 405-411 (1951) May.

A survey of the present status of air pollution research is presented. The progress has been discussed under headings of particle-size distribution, aerosols, gases, topography and meteorology and methods of contaminant removal.

D. L. Nicol

Silverman, L. WHAT PROCESS WASTES CAUSE AIR POLLUTION? *Chem. Eng.* 58, 132-135, (1951) May.

This general discussion of air pollution classifies contaminants as gases and vapors, and particulate matter, sub-divided into dusts, fumes, smokes, and mists. The common sources and harmful effects of these contaminants are given. Sampling problems involve the specialized techniques necessary for high concentrations found in stacks, and for low concentrations in the atmosphere.

W. E. Ball

Flame Failure Detectors

FLAME FAILURE DEVICES—PART 1 *Industrial Finishing* 3, 868-874 (1951) June.

Devices which ensure that flame failure shall not give rise to any danger either from gas poisoning or explosion are rapidly becoming the rule in industrial gas practice. Part one of this article discusses the objects to be fulfilled by flame-failure devices. Present types are described, and relative applications and advantages are discussed.

D. L. Nicol

Flame Flow Patterns

Tsien, H. S. INFLUENCE OF FLAME FRONT ON THE FLOW FIELD. *J. Appl. Mechanics*, 18, 188-194 (1951) June.

A theoretical mathematical discussion is made of the flow patterns caused by rapid combustion occuring at a flame folder in the combustion chamber. The presentation has not been checked with experimental data, but design features show that to achieve complete combustion at high-approach Mach-number an expanding combustion chamber is needed.

D. L. Nicol

Forge Furnace

AUTOMATICALLY CONTROLLED SLOT FORGE FURNACE. *Gas World*, (British) 31, 54-56 (Suppl.) (1951) May 19.

A new design is discussed for slot forge furnaces. Recirculation of flue gases with burnt gas from burners increases velocity of gas streams passing over work placed in the slot. Uniform temperature is maintained throughout the furnace chamber within 18° F. limits at 2200° F. Gas consumption for 1" x 1" x 5" steel billets was 0.015 Therms per pound of steel at 1830° F.

D. L. Nicol

Heat Recovery

Eibling, J. A. and Landry, B. A. THE STEAM-GENERATING STATION AS A SOURCE AND SINK FOR THE HEAT PUMP. *Mech. Eng.* 73, 554-558, 564 (1951) July.

A scheme is presented for the utilization of the waste heat in the condensing cooling water from steam-power generation as a heat source for homes. During the summer season the same water is used for cooling the houses by having it pass through centrally located spray ponds or cooling towers. Advantages and limitations of the system are listed. A comparison is made with a heat pump using the earth as a source of heat and a heat sink. Although the operating costs for both systems are approximately the same there is a saving of 13 to 23 per cent in investment in the heat pump of this system.

E. J. Pyrcioch

Industrial Burners

Henwood, J. B. (assigned to Selas Corporation of America) GAS BURNER WITH INTERNAL-COMBUSTION CHAMBERS. U.S. 2,559,504 (1951) July 3.

An industrial burner is described for the complete combustion within the burner head. Novel aspects include superheat of refractory material surrounding the main combustion chamber by an auxiliary burner surrounding the refractory shell.

D. L. Nicol

Tate, C. C. NEW DEVELOPMENT IN RADIANT HEATING FOR THE PETROLEUM INDUSTRY. *Petroleum Refiner* **30**, 103-106 (1951) May.

Application of the flameless ceramic-cup gas burner for furnaces in the petroleum industry has opened new design features to improve process variables. A furnace for a visbreaker is described.

D. L. Nicol

Waight, J. F. THE DESIGN OF TUNNEL BURNERS. *Gas World* (British) **133**, 649-652 (1951) [June 16]. Inst. Gas Engrs. Com. No. 384.

The design of burners which must operate against pressure and which must deliver a fully aerated mixture over a wide range of turn-down has been based largely on empiricism since an adequate theoretical treatment has been lacking. The author has developed a method of attack based on an analysis of the energy distribution in the burner system, and supports this theoretical treatment with experimental work. By this treatment the design features necessary to develop maximum pressure or energy can be calculated. Typical applications of burners for maximum energy at the burner nozzle are in local heating and in work in which a high rate of convection heat-transfer is necessary. Typical applications for maximum pressure at the burner nozzle are in burners capable of a wide range of turn-down.

D. L. Nicol

Synthetic Solid Fuel

Grand, J. A. and Miller, R. R. SOLID FUEL. U.S. 2,555,333 (1951) June 5.

This invention proposes a solid synthetic fuel of 75% nitroguanidine, 25% guanidine nitrate with ¼ to 8 parts of combustion catalyst (dichromate) the blend to be compressed at 5,000 to 30,000 psi into a portable cartridge. The mixture on burning generates 1 liter of gas per gram, at high pressures, and may be used to power small rockets or turbines or to pressurize fire-fighting equipment.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Broida, H. P. HYDROGEN-OXYGEN REACTION AT THE SECOND EXPLOSION LIMIT. p. 156

Coleman, E. H. EFFECT OF METHYL IODIDE AND CHLOROBROMOMETHANE ON THE LIMITS OF INFLAMMABILITY OF N-HEXANE IN AIR. p. 156

Karlovitz, B. INVESTIGATION OF TURBULENT FLAMES. p. 156

Smith, F. E. IMMERSION HEATER. p. 135

4. CARBONIZATION AND GASIFICATION

Coal Dustproofing

Martin, G. A. and Cloyd, R. W. DUSTPROOFING WITH OIL. *Coal Age*, **56**, 87-89 (1951) July.

It was formerly believed that the high viscosity oils were the most efficient in suppressing coal dust. However, experiments have shown that the amount of dedusting base is the significant factor, and that the viscosity as applied may be varied by using different proportions of diluent. The dust index decreases uniformly as the oil proportion increases, up to a point beyond which further oil additions cause no further reductions in dustiness. The optimum dosage is related to the surface area of the coal, rather than to weight.

W. E. Ball

Coal Pipeline

TO MOVE COAL THROUGH PIPELINE. *Coal-Heat* **60**, 39 (1951) June.

Pittsburgh Consolidation Coal Co. has announced plans for constructing a demonstration-size pipeline for the transportation of a coal-water slurry. Pilot-scale operations have indicated the feasibility of this operation. The installation will consist of a 12-in. pipeline about 17,000 ft. long, coal preparation equipment, pumps, coal driers, and complete instrumentation. It is expected that the capacity will be several thousand tons of coal per day.

W. E. Ball

Coal Properties

Dulhunty, J. A. and Penrose, R. E. SOME RELATIONS BETWEEN DENSITY AND

RANK OF COAL. *Fuel* (British) **30**, 109-113, (1951) May.

A method is described for measuring in water the true densities of coals which cannot be dried without undergoing permanent physical change. Densities of coals from peat to anthracite show some relationship to content of carbon, hydrogen and inherent moisture. Coals are divided into three classes on the basis of these observations.

W. E. Ball

Malherbe, P. leR. MICROSTRUCTURE OF SOME SOUTH AFRICAN COALS. *Fuel* (British) **30**, 97-109, (1951) May.

Low-temperature adsorption isotherms for argon on 15 South African coals were determined, and surface areas were calculated by the BET equation. Fine samples showed greater surface areas than coarse samples. Since the increase was larger than could be accounted for by external surface area, more internal surface area must have been accessible in the fine sample. Adsorption was found to be a function of time, increasing even after 1500 hours in one case. A standard adsorption time of 10 min. was used for estimation of the "immediately available" surface. Surface areas were calculated on the adsorption branch only, since the slow sorption caused a marked irreversible hysteresis. All desorption curves showed sharp kinks at a relative pressure of 0.46. Application of the Kelvin equation for capillary condensation showed that this kink corresponded to a capillary radius of 12Å, that most of the pore volume is contained in pores of 250 Å radius, and that the area of pores of 10 Å radius corresponded to the BET surface. Since no relationship was noted between heat of wetting and BET surface, it was theorized that the heat of wetting with methanol was mostly due to imbibition and swelling rather than to wetting of the surface. Thus, contrary to earlier opinions, it is held that the heat of wetting is not a measure of internal surface. The lack of relationship between oxygen absorption in spontaneous combustion tests and both the heat of wetting and BET surface indicated that chemical properties may be determinative.

W. E. Ball

Rapson, W. S. SOUTH AFRICAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH: NATIONAL CHEMICAL RESEARCH LABORATORY. *Chem. and Ind.* (British) 366-368, (1951) May 12.

Among recent research activities, discrepancies in the measurement of the surface areas of coals by gas adsorption and heat of wetting have been revealed. It has been shown that the latter measurements are in error. It is also believed that the nature of the coal surface rather than its extent is the important factor in controlling reactivity.

S. Katz

Coal Washery Performance

Yancey, H. F. and Geer, M. R. EFFICIENCY AND SHARPNESS OF SEPARATION IN EVALUATING COAL-WASHERY PERFORMANCE. *Mining Engg.* **3**, 507-517, (1951) June.

Various criteria for evaluating the performance of coal washeries are discussed critically, with particular reference to ideas developed at the First International Conference on Coal Preparation held in Paris in June 1950. Criteria that relate only to the sharpness with which a cleaning unit separates coal from impurity are compared with those that reflect loss of coal or quality of products.

Authors' Abstract

Coke Briquettes

Kern, F. C. METHOD OF MAKING COKE BRIQUETTES. U.S. 2,556,154 (1951) June 5.

Liquid naphtha and pulverized pitch are added to minus 200-mesh coal, and the mixture is agitated to form a paste. Water and crushed coal (minus 30-mesh) are added, and the mixture ground in a wet-pan grinder. After grinding, briquettes are prepared at relatively low pressures. These are carbonized at low temperatures yielding gas, a variety of oils, pitch, and smokeless briquettes.

W. E. Ball

Coke Ovens

Davis, G. A. (assigned to Allied Chemical & Dye Corp.) SIMULTANEOUSLY FIRING A COKE-OVEN BATTERY WITH RICH AND

LEAN FUEL GASES. U.S. 2,554,818 (1951) May 29.

For simultaneous firing with lean and rich gas, the lean gas is fed to the inflow gas regenerators at constant pressure; a small amount is withdrawn and mixed with the rich gas, and the mixture fed to the flues. The volume of mixed gas is sufficient for the maintaining of positive pressure in the rich-gas distribution system, and uniform distribution to the flues, regardless of variations in draft.

W. E. Ball

SIMON-CARVES. *Gas J.* (British) **267**, 65 (1951) July 4.

The contract awarded to Simon-Carves, Ltd., by Great Lakes Carbon Corporation for the construction of a battery of 40 coke ovens at St. Louis, is believed to be the first coke oven contract ever obtained in the United States by a British firm. The ovens will be of the latest twin-flue, twin-regenerator type, 20½ in. in width, with a taper of 3 in. Foundry coke is to be produced, on a 25 hr. coking time.

W. E. Ball

Coke Properties

Banerjee, S. and Sarjant, R. J. REACTIVITY OF COKE. *Fuel* (British) **30**, 130-139 (1951) June.

An experimental method of classifying the reactivity of coke, experimental results, interpretation and correlation of data with variables such as origin of parent coal, temperature of coke bed, reactor pressure, and ultimate strength of coke is presented. Reactivity as defined in this article obeyed the Arrhenius equation.

S. Mori

Hills, D. C. and Holmes, C. R. MOISTURE CONTENT OF VARIOUS COKE SIZES. *Ind. Eng. Chem.*, **43**, 1635-1641 (1951) July.

This work was undertaken to explain the differing moisture contents of the various coke sizes. In general, moisture decreased as size increased, the exception being the smallest coke size. The general trend was easily explained on the basis of drying of the larger pieces by internal heat after quenching. The behavior of the smallest coke was less easy to explain. It was found that cool coke absorbed less moisture than hot coke, probably because cooling promotes adsorption of gases from the atmosphere. Since the smaller coke sizes tend to segregate on the cooler floor of the quenching car, the lower quenching temperature may be responsible for their comparatively low moisture contents.

W. E. Ball

Coking Coal Reserves

Dowd J. J., Turnbull L. A., Toenges A. L., Abernethy R. F., and Reynolds D.A. ESTIMATE OF KNOWN RECOVERABLE RESERVES OF COKING COAL IN PIKE COUNTY, KY. *U.S. Bur. Mines Report of Investigations* 4792, (1951) May.

This is the third in a series of reports on reserves of coking coal by counties. Pike County contains large reserves of high-volatile A bituminous coals, possessing many of the excellent properties characteristic of West Virginia coals. The moisture, ash and sulfur contents usually are low. Since highly fissured coke is obtained from eastern Kentucky coals when carbonized singly, these coals must be blended with 15 to 30% low- or medium-volatile coal. The four major beds are: Upper Elkhorn No. 3, Upper Elkhorn No. 2, Upper Elkhorn No. 1, and Lower Elkhorn. Of lesser importance are the Winifrede, Williamson, and Bingham Beds, some ten other beds, and numerous uncorrelated lenses.

W. E. Ball

Electrostatic Precipitation

Roos, W. J. and Warburton, R. W. (assigned to Westinghouse Electric Corp.) ELECTROSTATIC PRECIPITATOR. U.S. 2,556,982 (1951) June 12.

Inexpensive, disposable collector electrodes are provided for locations remote from a flushing water supply, and for applications where flushing does not adequately remove the collected matter.

W. E. Ball

Sproull, W. T. PRECIPITATORS STOP DUST AND FUMES. *Chem. Eng.* **58**, 151-154, (1951) May.

The general principles of operation and design of Cottrell precipitators are given. These pre-

cipitators are compared to other collecting apparatus, such as cyclones, baghouses, scrubbers, and ultrasonic agglomerators. The Cottrell is comparatively versatile, being used for the collection of such diverse materials as tobacco smoke and up to 100 tons of fly ash or cement dust per day. The ordinary temperature range is up to 700° F., although some dry dusts may present difficulties in the range of 200-270° F.

W. E. Ball

Sproull, W. T. and Nakada, Y. OPERATION OF COTTRELL PRECIPITATORS. *Ind. Eng. Chem.* **43**, 1350-1370 (1951) June.

These tests were undertaken to determine the most efficient operating conditions for Cottrell precipitators. Measurement of the apparent resistivities of typical dusts and fumes indicated maxima in the range of 200-400°F, and that resistivity decreased as the gas humidity increased. It was concluded that precipitation will become more efficient and trouble-free with increase in the moisture content of the gas. At temperatures above 500°F, moisture has the additional desirable feature of increasing the sparking voltage.

W. E. Ball

Wintermute, H. A. (assigned to Research Corporation) ELECTRICAL PRECIPITATOR. U.S. 2,555,216 (1951) May 29.

An electrical precipitator with liquid-flushed electrodes is described. Sprays and liquid distributors are provided to direct flushing liquid evenly over vertical extended-surface electrodes. The electrodes specifically described are constructed of woven wire. A plenum chamber is provided for uniform gas distribution.

W. E. Ball

Gas Desulfurization

Spillane, P. X. (assigned to Keith Williams, Australia) PROCESS FOR THE DESULFURIZATION OF HYDROCARBONS. U.S. 2,559,323. (1951) July 3.

A process for desulfurizing hydrocarbons is described. The catalyst comprises iron oxide intimately combined with alkali (sodium) carbonate in an amount equivalent to between 5 and 40% of the mixture. An essential feature of the patent is the reduction of this contact-mass with hydrogen-carbon monoxide gases (such as water gas) in a manner similar to that used in pretreating a catalyst for the hydrogenation of carbon monoxide. One example cites the desulfurization of a town gas containing 20 grains of organic sulfur per 100 cu.ft. into a product containing 0.5 grain.

C. H. Riesz

Spillane, P. X. (assigned to Keith Williams, Australia) TREATMENT OF SULFUR-CONTAINING MATERIALS. U.S. 2,559,324 (1951) July 3.

A catalyst similar to that specified in Patent 2,559,323 after complete sulfur fouling is used at temperatures of 175-500° F. to convert gaseous sulfur compounds (other than oxides of sulfur) into elemental sulfur or mixtures of elemental sulfur and sulfur dioxide.

C. H. Riesz

Spillane, P. X. (assigned to Keith Williams, Australia) PROCESS FOR THE CONVERSION TO SULFUR AND/OR SULFUR DIOXIDE OF OTHER SULFUR COMPOUNDS AND CATALYSTS THEREFOR. U.S. 2,559,325. (1951) July 3.

A process is described for the conversion of gaseous sulfur compounds into elemental sulfur or mixtures of sulfur and sulfur dioxide. The contact used at temperatures of 175-500° F. comprises a metal sulfide (nickel, cobalt, manganese, tin or aluminum) and an alkali sulfide (5% to 66% of the metal sulfide). One example cites the reduction in hydrogen sulfide concentration in a coke-oven gas from 200 to 4 grains per 100 cu. ft. the difference appearing as elemental sulfur vapors.

C. H. Riesz

Interlinked Gas Supply

Burns, J. GAS MANUFACTURE I NORTH THAMES. *Gas J.* (British) **266**, 771, 772, 777-788, (1951) June 13; *Gas World*, (British) **133**, 576-585 (1951) June 2.

This paper is an extensive abstract of Inst. Gas Engineers Comm. No. 385. It discusses the methods of application of the fundamentals of gas manufacturing practise to a centralized and inter-linked grid system. About 85% of

the gas output of the N. Thames area (total installed capacity of 374 MMCFD 500 Btu. mixed gas) is made in the former Gas Light & Coke Co. stations. This older grid, based on the 100 MMCFD station at Beckton, consists of twin 48-inch mains linking 12 additional stations to the west. Nationalization added 10 smaller stations chiefly on the fringe of the older grid area. The paper discusses the aspects of interlinking stations (1) without changing output of individual stations and (2) with increased centralization of manufacture. Factors such as (1) labor, (2) cost of materials, especially coal, (3) marketing cost of coke, (4) cost of needed link mains (5) cost of interstation pumping (6) capital, labor and general overhead requirements of large or small stations,—enter into any decision between the two methods of manufacture. Operation of the system to meet swings of demand, load control and dispatching, type and costs of manufacturing plant (coal, water gas and peak-load oil gas), purification, and steam and power costs and production are discussed in detail.

B. E. Hunt

Copp, A. D. DISTRIBUTION DEVELOPMENT IN THE WESTERN AREA OF THE NORTH THAMES GAS BOARD. *Gas World* (British), **33**, 595-597 (1951) June.

This is an abstract of Communication No. 388 presented at the Institute of Gas Engineers in London, May 31, 1951. The economics of bulk supply are summed up and the economics of transporting coke for local sale are compared. Appendices are added in which statistics are presented of gas storage capacities and of inclusive costs of manufacture and transmission.

B. E. Hunt

Liquid Effluent Treatment

Bondy, H. F. and Priestley, J. J. THE IMPROVEMENT OF EFFLUENT LIQUORS. *Gas World* (British) **33**, (CS) 53-58 (1951) June 2.

The legal aspects of stream pollution are discussed, and typical purification plants are briefly described. Details are given of the process used at Bolsover, where unusual problems were encountered in the disposal of liquor from a low-temperature carbonization (Coalite) plant. The liquor contained 65% monohydric and 35% dihydric phenols. In the first step, the liquor is extracted with butyl acetate (1:8 ratio) in packed towers, and distilled. The extract is also distilled, yielding a product containing 90% phenols. Operating and cost data for the operation are given.

W. E. Ball

Ingersoll, A. C. FUNDAMENTALS AND PERFORMANCE OF GRAVITY SEPARATION: *Petroleum Refiner* **30**, 106-118, (1951) June.

The theory of the settling velocity of a particle and the studies of settling of discrete and flocculent suspensions are reviewed briefly. Earlier findings on sedimentation in fill-and-draw and in continuous-flow basins are discussed. Criteria for the design of settling tanks, such as the factors of detention time, inlet velocity, baffles, shape of tank, and also modern experimental studies with tracers and models on short-circuiting, mixing and displacement are reviewed. The application of these sedimentation studies to the problem of oil refinery waste-waters is described. Over 150 references are given.

O. P. Brysch

Lowenstein-Lom, W. A NEW DEPHENOLISATION PROCESS FOR LOW-TEMPERATURE CARBONISATION PLANTS. *Intern. Chem. Eng. and Process Inds.* (British) **32**, 216-218 (1951) May.

Ammoniacal liquors from low-temperature carbonization plants are particularly difficult to purify, because the high concentration of higher phenols causes unfavorable distribution between benzol and water. Tests with various fractions of straw-oil showed that certain fractions were superior to either benzene or benzol. The large-scale use of straw-oil reduced the phenol concentration in the liquor to 0.2 gm. per l., spraying on boiler ash lowered it to 10-15 mg. per l., and dilution brought it down to less than 1 ppm.

W. E. Ball

Marsden, A. THOUGHTS ON THE TREATMENT AND DISPOSAL OF GAS WORKS EFFLUENTS—I, II, AND III. *Gas World*

(British), 133; 524-527, May 26; 653-656, June 16; 672-677 (1951) June 23.

A comprehensive review of the liquor disposal problem is presented in this series of articles. Contaminating liquors include: Ammonia and sulfate liquors, carburetted water-gas effluent, coke-quenching liquors, boiler blow-down, and water from benzol plant, decanters, gas holders, and miscellaneous drains and siphons. The methods for treating these effluents are discussed, with particular emphasis upon ammoniacal liquors. It is recommended that liquor be given a preliminary treatment, followed by discharge into the sewer for final treatment at the sewage disposal plant. The disadvantages of the disposal methods of evaporation, coke quenching, and percolation are pointed out. The test methods commonly used, the B.O.D. and oxygen absorption, have definite limitations. Mention is made of favorable results obtained by the use of ammonia liquor as a fertilizer. The legal and economic aspects are discussed. Fifty-nine references are given.

W. E. Ball

Oil Gas

Horn, R. J. OIL GAS PRODUCTION ON THE WORLD'S FIRST REVERSE FLOW REGENERATIVE MACHINE-POUGHKEEPSIE, NEW YORK. Paper PC-51-12, Am. Gas Assoc., Prod. and Chem. Conf., New York (1951) May; *Gas*, 27, 68 (1951) July.

The design and method of operation of a three-shell (eleven-foot outside diameters) reverse flow, regenerative high Btu oil gas set is described in detail and complete operating data with two premium residual oils are given. The set consists of an empty oil-gas generator (reactor) with a brick "doughnut" at the bottom of the reaction zone placed between a regenerator and a fixing chamber. The four-minute cycle is divided into a back-blast, forward-blast, make and inert purge.

H. R. Linden

Linden, H. R. and Pettyjohn, E. S. PROCESS VARIABLES AND OIL SELECTION FOR HIGH BTU OIL GAS PRODUCTION. Paper PC-51-9, Am. Gas Assoc., Prod. and Chem. Conf., New York (1951) May; *Gas*, 27, 68 (1951) July; *Am. Gas Assoc. Monthly*, 33, 14-15 (1951) June.

This paper presents experimental data obtained in the thermal gasification of typical gas-making oils under operating conditions simulating present and anticipated high Btu oil-gas manufacturing practice using a 2½ inch diameter laboratory cracking tube. The operating variables considered were the cracking temperature, the residence time at temperature, and the partial pressure of the oil gas leaving the cracking zone. The oils were characterized by their carbon-hydrogen weight ratio and their Conradson Carbon residue. Steam and nitrogen were used as diluents or carrier gases and were found to have the same effects on cracking results at equivalent volume concentrations in the 1400 to 1700° F. cracking-temperature and 1 to 5 seconds residence-time ranges. Btu. recoveries in the finished make-gas, total oil-gas yields, tar plus carbon yields, carbon deposition, tar properties and oil-gas composition were correlated with operating variables and oil properties and these correlations are presented in graphical and mathematical form. A method of evaluating and selecting oils for high-Btu oil-gas production on the basis of the net cost per therm of cracking product in the gas produced is outlined.

H. R. Linden

Purification Costs

"Purifier" CRUDE GAS TO FINISHED PRODUCT: (1). Tower Purifiers or Tours d'Epuration: (2). Condensing Costs. *Gas Times* (British) 66, 402, March 23; 67, 125-6, April 20, (1951).

1. The factors concerned in the costs of tower purifiers are discussed, contrasting French design of four parallel lines of five 10-foot towers in series with English design of five 20-foot towers in series. 2. Costs of water and pumping power are discussed with relation to selection of condensing and cooling plants.

O. P. Brysch

Solid-Fuel Gasification

Jenkins, C. E. APPARATUS FOR GASIFICATION OF WOOD. U.S. 2,556,090 (1951) June 5.

This invention is a gas producer designed to use wood (and resultant charcoal) as fuel. The

cylindrical shell charged with wood and charcoal is blasted with air through an axially-located annulus which jackets the gas offtake pipe. The air is distributed radially at the combustion-zone level and moves in a vortex over the fuel surface on the periphery of the combustion space, while the tar-free reduced combustion gases under a slight pressure form a wall-to-center eddy which is vented through the gas outlet pipe.

O. P. Brysch

Nelson, K. J. (assigned to Standard Oil Development Co.) GASIFICATION OF CARBONACEOUS SOLIDS. U.S. 2,554,263 (1951) May 22.

Finely-divided carbonaceous materials are treated in a fluid-bed gasification zone, heated and fluidized by gases from a combustion zone in which some of the partly-gasified carbon is burned with oxygen.

O. P. Brysch

Ramseyer, C. F. (assigned to H. A. Brassert & Co., New York) MANUFACTURE OF WATER GAS. U.S. 2,552,866 (1951) May 15.

A low-pressure continuous water gas process is described in which finely-divided peat, lignite and wood are charred and the char is suspended by superheated steam at 50 to 500 psi. The suspended stream in a spiral pipe-coil is externally heated to 800 - 1600° F. to give the water-gas reaction, the gas then passing through a coil to exchange heat with the incoming charge.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brown, C. A. GAS CLEANING MEDIA FOR CLEANING DUST AT REGULATING STATIONS. p. 143

Bulkley, TEMPERATURE-PRESSURE-CONCENTRATION CHART FOR AMMONIA-WATER SOLUTIONS. p. 152

Eads, D. K. SELECTIVE ABSORBENT AND METHOD OF MANUFACTURING AND USING SAME. p. 146

Komarewsky, V. I. HYDROGENOLYSIS OF THIOPHENE. p. 161

Owen, A. J. THERMODYNAMICS OF CARBON DISULFIDE SYNTHESIS. p. 161

Partington, J. R. THE THERMAL DECOMPOSITION OF CARBONYL SULFIDE. p. 161

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black

Krejci, J. C. (assigned to Phillips Petroleum Co.) PROCESS AND APPARATUS FOR PRODUCING CARBON BLACK. U.S. 2,556,-196 (1951) June 12.

This is concerned with the manufacture of carbon black by the furnace method. An improved method for preheating the feed to the furnace is claimed. A refractory preheat tube supplied with a core buster and discharging directly into a furnace is described.

J. D. Parent

Dust Removal

Brown, C. A. GAS CLEANING MEDIA FOR CLEANING DUST AT REGULATING STATIONS. *Gas Age* **107**, 32-34 (1951) May 10.

Whenever conversion from manufactured to natural gas has taken place, dust problems have arisen. The problems encountered at Rochester Gas and Electric Corp. are described. Drying-out of previous deposits with the mixture of oxide coming in with the natural gas, and mixing of dust and fog oil already present are thought to be chief causes. Three types of gas scrubbers are described that will aid in solving this problem, Sta-new gas filter, Aerotec gas scrubber, and the Blaw-Knox gas cleaner. The first is a filter, second a cyclone separator, and the third a wet scrubber.

C. L. Tsaros

Ethane Pyrolysis

Wall, L. A. and Moore, W. J. PYROLYSIS OF MIXTURES OF ETHANE AND ETHANE-d_6[1]. *J. Am. Chem. Soc.* **73**, 2840 (1951) June.

The pyrolysis of 50-50 mixtures of C_2H_6 and C_2D_6 (D=deuterium) was studied. The results indicate that free radicals and hydrogen atoms occur in the decomposing mixture. The decomposition of the light ethane is about 50% fas-

ter than that of the heavy ethane; the formation of CD_3 radicals from C_2D_6 is about 5 times faster than the production of CH_3 radicals from C_2H_6. Both these effects and the influence of nitric oxide are discussed.

C. H. Riesz

Gas Storage

Allen, J. W. (assigned to John H. Wiggins.) DRY SEAL GAS HOLDER. U.S. 2,554,765; 2,554,766; 2,554,767; 2,554,768 (1951) May 29.

The first patent of this group describes a dry-seal gas holder equipped with piston having an annular backing and reinforcing structure designed to maintain the dry seal in a desired shape during the rise and fall of the piston. The second patent describes a balancing mechanism for use with short-storage apparatus having a vertically-moving bell. This mechanism maintains the bell in a level position during its rise and fall, overcomes the necessity for high supporting structures for the cable sheaves, and eliminates cables inside the vessel. The third patent describes a dry-seal pressure-type gas holder equipped with one main piston and one or more annular members designed to withstand the pressure of the gas while maintaining the dry seal in a desired shape during the rise and fall of the piston. The fourth patent describes a method of constructing dry-seal piston-type gas holders by fabricating the upper side-walls and roof at a level lower than they occupy in the finished structure, and then lifting these parts by fluid pressure applied to the piston of the apparatus.

J. J. Guyer

Haselden, G. G. and Reis, M. W. THE USE OF STORED LIQUID METHANE TO MEET PEAK LOADS AT GASWORKS. *Gas Times* (British) 67, 184, 189-200 (1951) May 4.

Meeting peak loads requires (1) cheaper or more rapid methods of coal gasification or (2) storage of a derived fuel during periods of low load. The storage of methane from coal gas is discussed from the standpoint of load requirements, size of carbonizing plant, size of auxiliary carrier-gas plants. The economics of combinations of methane plant with ethylene fractionation and oxygen liquefaction units are considered. Design for a 1-million-gal. storage plant, suggested layouts, some cost data, and 3 pp. of discussion are included.

O. P. Brysch

SENATE GROUP SHELVES BILL ON UNDERGROUND GAS STORAGE. *Oil Gas J.*, 50, 109 (1951) July 5.

The Senate committee on interstate and foreign commerce has postponed action on a bill that would give natural-gas companies the right of eminent domain when seeking underground storage locations.

J. D. Parent

COLUMBIA BUYS MORE GAS TO AVERT APPALACHIAN SHORTAGE. *Oil Gas J.*, 50, 135 (1951) June 28.

Columbia Gas System has made arrangements with Transcontinental Gas Pipe Line Corp. and four of its customers to buy gas for summer storage that would ordinarily be burned under boilers.

J. D. Parent

METHODS OF STORING GAS. *Am. Gas J.* 174, 31-34 (1951) May.

This is a general article on methods of storage in the continuing series on American Gas Fundamentals.

O. P. Brysch

LP-Gas Handling

Campbell, F. F. NBFU PAMPHLET NO. 58 . . . COMMENTARY. *LP-Gas* 11, 55-63 (1951) May.

The recent National Board of Fire Underwriters Pamphlet no. 58 is interpretated for the practical application of these standards which have been established for the protection and guidance of the L-P Gas industry.

D. L. Nicol

Francis, A. W., Jr. LOW-TEMPERATURE SEPARATION AS APPLIED TO GAS-CONDENSATE PRODUCTION. *Oil Gas J.*, 50, 69, 70, 73, 84, 86 (1951) July 5.

This is another article covering the removal of hydrocarbon liquids and water from condensate by a low temperature process involving hydrate formation as an intermediate step. The process has already been described in earlier articles. Considerable data are presented.

J. D. Parent

Smith, L. W. TRANSFERRING LP-GAS WITH LIQUID PUMPS. *Butane-Propane News* **13**, 47-55 (1951) July.

Vapor should be kept out of the pump suction line in order to maintain full capacity. Loss in pressure in the suction line between the tank and pump because of friction can be offset by mounting the tank at a level above that of the pump. Tables are provided to permit evaluation of the required increase in level.

J. D. Parent

Thompson, H. E. (assigned to Union Carbide and Carbon Corporation.) SYSTEM FOR CONSERVING LIQUEFIED GASES. U.S. 2,550,886 (1951) May 1.

A method for the economical transportation of liquefied gases by barge is described wherein the liquified gas is maintained at a moderately reduced temperature and a low superatmospheric pressure. 48° F. and 75 psig are the preferred conditions for transporting propane in the invention. Only moderate refrigeration is required under these conditions. The refrigeration is supplied by a compressor which draws vapor from the containers, compresses it into a condenser cooled by water from the waterway. The liquified vapors are then expanded through a valve and passed into the containers to cool the content. The compressor is operated by burning a small amount of the cargo in a gas engine. Advantages claimed are a reduction in the weight of the storage containers, increased density of the cargo and only moderate heat insulation required.

O. T. Bloomer

LP-Gas Motor Fuel

Thorne, W. R. POTENTIAL EFFECT OF TRACTOR CONVERSIONS TO LP-GAS. *Butane-Propane News* **13**, 53, (1951) June.

The difference in cost of L-P fuel and gasoline for internal-combustion engines has brought a boom in conversion of tractors to the use of L-P gas. This load has the possibilities of balancing out the winter load of house heating and can increase total base-load.

D. L. Nicol

Clifford, E. A. A PRACTICAL GUIDE TO LP-GAS UTILIZATION. CHAPTER 28: LP-GAS CARBURETION. *LP-Gas*, **11**, 99-109 (1951) July.

The use of LP-Gas as an internal combustion fuel is discussed, especially as a tractor fuel for balancing summer and winter loads. A comparison is made between efficiency and economy of gasoline and LP- gas operated vehicles. A general description of types of LP-gas containers, and methods of carburetion are given.

E. F. Searight

LP-Gas Storage

Wastie, A. E. GRAPHS SHOW VAPORIZATION OF LIQUID IN PROPANE TANKS. *Am. Gas J.* **174**, 21 (1951) June.

Assuming an overall heat-transfer coefficient of 2 B.t.u./hour /° F/wetted sq. ft., curves have been calculated showing the rate of evaporation vs. outside temperature with required tank pressures as a parameter.

C. L. Tsaros

FIRE PROTECTION OF LP-GAS STORAGE AND UNLOADING AREAS. *LP-Gas*, **11**, 70, 71 (1951) May.

LP-Gas fires usually result from failure of equipment that allows a large gas leak to develop. Ignition usually follows and a large scale fire develops. A method of isolating the supply of fuel gas to the fire must be developed before the fire can be extinguished. If the fire is extinguished and the gas supply or leak remains unchecked it will reignite. A combination of CO_2 and water spray equipment has been found most effective in combatting these fires. Adequate placement and supply of this equipment in storage and unloading areas is imperative. Duplicate equipment and hydrants must be placed on at least two opposite sides of the area to be protected so that equipment may be reached regardless of wind direction.

W. G. Bair

Nitrogen Removal

Bodle, W. W. and Deschner, W. W. (assigned to J. F. Pritchard & Co.) METHOD OF TREATING NATURAL GAS. U.S. 2,557,171 (1951) June 19.

This patent is concerned with the removal of inert components, chiefly nitrogen, from natural gas. Low temperature fractionation is the

process to be used. Two systems are discussed, one which is for total nitrogen removal and the other for partial removal.

J. D. Parent

Pipe Shortages

Linz, B. F. AFTER JULY 1 MILLS MUST HOLD TUBULAR GOODS FOR SALE TO PRIORITY HOLDERS: PRIORITIES WILL ASSURE AVAILABILITY. *Oil Gas J.* **50**, 155 (1951) June 21.

As of July 1, producers must reserve all seamless alloy-steel tubular goods produced for rated orders under the Controlled Materials Plan.

J. D. Parent

STEEL FIGHT. CHAPMAN JOINS PAD IN EFFORT TO GET MORE STEEL FOR OIL INDUSTRY. *Oil-Gas J.* **50**, 53 (1951) June 28.

Interior Secretary Chapman has pointed out that the steel allocated by DPA to the gas industry is inadequate and that some steel mills may be cut off from natural gas this winter. Figures for PAD division of steel to the industry for the third quarter are given.

J. D. Parent

PAD HAS SIX SPECIAL COMMITTEES WHICH COOPERATE TO FUNNEL CRITICAL ITEMS TO NEEDY USERS: HERE'S HOW THEY FUNCTION. *Oil Gas J.* **50**, 157 (1951) June 21.

Six committees have been set up in PAD to handle securing and distributing critical materials required by the oil and gas industry. A diagram is furnished which shows the procedure followed by the committees.

J. D. Parent

Production Problems

Fogarty, J. E. INDIRECT COIL HEATERS PREVENT FREEZEUPS BETWEEN WELLHEAD AND TRANSMISSION LINE. *Gas*, 27, 133 (1951) May.

An immersion heater to prevent well heat freeze-ups is described.

J. D. Parent

Hereford, G. W. TESTING GAS WELLS BY BACK PRESSURE METHOD. *World Oil*, **132**, 198, 201-204 (1951) June.

The U.S. Bureau of Mines "back-pressure" method for testing gas wells is briefly outlined. Examples are presented to show the use of the method. The necessity for accurate data is stressed and probable sources of error when the data do not show the expected correlation are listed.

O. T. Bloomer

Lubinski, A. BUCKLING OF ROTARY DRILLING STRINGS Part 4 (Conclusion) *World Oil* **132**, 124, 126, 128, 129 (1951) June.

Concluding the mathematical analysis of forces leading to buckling of the drilling string, the author presents mathematical equivalents for the various theoretical considerations developed in Parts 1 and 2 of this series. As a further development he also evaluates the effect of combination drilling strings and the effect of hydrostatic pressures on the string.

Author's Abstract

APPLICATION OF BOTTOM-HOLE-PRESSURE SURVEYS TO RESERVOIR ENGINEERING. *Oil Gas J.*, **50**, 93 (1951) July 5.

Measurement of reservoir pressure on a field-wide basis is useful in proper operation. A bottomhole survey will not only provide a basis for obtaining a proper average pressure, but will permit study of anomalies and evaluation of required shut-in times.

J. D. Parent

Sulfur Recovery

Eads, D. K. (assigned to Texas Gulf Sulphur Co.) SELECTIVE ABSORBENT AND METHOD OF MANUFACTURING AND USING THE SAME. U.S. 2,554,819 (1951) May 29.

The preparation of an absorbent for use in the selective absorption of hydrogen sulfide from gaseous mixtures containing sulfur dioxide is described. Solutions of copper salts are mixed with phosphate solutions at about 90° C., at a controlled pH value of about 3. The resulting precipitate is dried at about 700° F. to give an absorbent of desired uniformity, activity, and mechanical strength. Test data of the effectiveness and selectivity of this absorbent are tabulated.

C. E. Hummel

Fetterly, L. C. (assigned to Shell Development Co.) CONVERSION OF HYDROSULFIDES

TO NEUTRAL SULFUR COMPOUNDS. U.S. 2,557,643 (1951) June 19.

A simple, efficient, and economical method is claimed for the conversion of H_2S and mercaptans to free sulfur and organic disulfides. Sour hydrocarbon gases and liquids are contacted with air at 60-200° F. in a neutral or slightly acidic aqueous solution containing an organic oxidation catalyst, such as sodium indigo sulfonate, and the resulting oxidation products are recovered.

H. Hakewill

Resen, F. L. NEW SULFUR PROCESS. *Oil GAS J.*, **50**, 59 (1951) May 31.

A low-temperature, catalytic oxidation process for the recovery of elemental sulfur from hydrogen-sulfide containing gases has been announced by the Jefferson Lake Sulfur Company. The usual procedure of burning a portion of the raw gas to provide sulfur dioxide is avoided. Instead, sulfur dioxide is obtained by burning a portion of sulfur and is used as the oxidizing agent for the hydrogen sulfide in a reactor of undisclosed design containing a special catalyst.

C. H. Riesz

SULFUR: ENOUGH BY '52. *Chemical Week*, **68**, 33, 34 (1951) June 30.

The present sulfur shortage is expected to be eliminated by the fall of 1952, by new production of 1.2 million tons of sulfur per year. Three new sulfur domes in Louisiana and Texas, employing the Frasch process, are to supply half of this amount. Sulfur will also be produced from natural gases containing hydrogen sulfide and from pyrite. Mexico, Italy, and several other countries are expected to supply sizable amounts of sulfur. Sulfur produced by these new developments will have a higher market price.

C. E. Hummel

SULFUR PRODUCER. EAST TEXAS GAS-DISTILLATE DISCOVERY HAS HYDROGEN-SULFIDE CONTENT ESTIMATED AT 42 PE RCENT: CORROSION IS PROBLEM. *Oil Gas J.*, **50**, 82-86 (1951) May 24.

A new discovery well in the East Texas field produces an estimated 3,000,000 CF per day of gas containing 42% hydrogen sulfide. It is calculated that 45 tons of sulfur could be produced. Doubts about the extent of the pool and corrosion problems indicate that development will be slow.

C. H. Riesz

Transmission Line Operation

Dunn, E. B. COST AND OPERATING CHARACTERISTICS OF MICROWAVE SYSTEMS. *World Oil* **132**, 223, 224, 226 (1951) June.

In November 1949, there was about 70 miles of pipeline right of way covered by microwave communications equipment. Today there is about 11,000 miles in operation or under contract. Audio quality is excellent and from 5 to 24 channels can be handled. There is some seasonal fade, but in general the system is free from weather troubles as long as proper frequencies are used. An annual cost figure of $150 to 200 per mile is given; this is about half maintenance and half depreciation. Pipeline frequencies now used are 2,000mc and 6,700mc.

J. D. Parent

Ricketts, R. D. COOLING WATER DESIGN ADDS ECONOMY, EFFICIENCY. *World Oil*, **132**, 232, 234 (1951) June.

A description with flow diagram is given of the engine jacket water and lube-oil cooling system used in the Transcontinental Gas Pipe Line Corp.'s new compressor stations. Because of the scarcity of water, atmospheric cooling section were used. The water temperature is automatically controlled with a by-pass arrangement. The water from the lube oil coolers is mixed with the water going to the engine jackets with a resultant decrease in the total volume of water to be circulated.

O. T. Bloomer

Taylor, J. C. HOW DETROIT UPPED DISTRIBUTION FOR 150,000 NEW HEATING JOBS. *Gas Age* **107**, 59, 60, 86 (1951) May 24.

Detroit increased the capacity of the city low-pressure distribution system by elevating distribution pressures to 1½ or 2 psi and installing service regulators. The unaccounted-for gas increased slightly in volume over the previous year but decreased in terms of the percent of total send-out.

B. E. Hunt

Watkins, E. G. ANCHORING GAS MAINS. *Gas*, **27**, 30-35 (1951) June.

The anchorage and reinforcement of gas mains which have been converted for use at higher pressures is discussed. Methods are given of predicting and overcoming the forces—internal pressure, temperature variation and external loads—which tend to cause a gas main to move.

J. J. Guyer

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Hasche, R. L. Apparatus for Producing Acetylene. p. 160

Turpish, J. V. Guide Covering Changeover Practices. p. 134

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalytic Cracking

Ashley, K. D. (assigned to American Cyanamid Company). PRODUCTION OF MICROSPHEROIDAL GEL CATALYST BY SPRAY DRYING. U.S. 2,555,282 (1951) May 29.

Microspheroidal gel catalysts of the alumina-silica, magnesia-silica and alumina-magnesia-silica type are formed by preparing hydrous gels which are ground into material essentially finer than 30-mesh. The ground material in each case is dispersed as a 4-10% aqueous suspension which is then spray-dried in suspension at 600-1000° F. to form spheroid particles.

C. H. Riesz

Kennedy, R. M., Hill, D. and Schneider, A. (assigned to Sun Oil Company) CATALYTIC REACTION OF ISOPARAFFIN HYDROCARBONS. U.S. 2,557,113 (1951) June 19.

Hydrocarbon reactions such as disproportionation are conducted in the presence of a catalyst comprising boron trifluoride and an alkyl fluoride containing at least two carbon atoms. The patent is well illustrated by 22 examples.

C. H. Riesz

Pattison, J. N. NOMOGRAPH FOR CALCULATING CONTACT TIME FOR VAPOR-PHASE REACTIONS. *Ind. Eng. Chem.* **43**, 1444-1446 (1951) June.

A nomograph is presented from which contact time for vapor-phase reactions, both thermal and catalytic, can be estimated within ± 10%.

Abstractor's note: The calculation of contact time as used here is a simple and straight-forward arithmetic procedure so that a nomograph seems unnecessary; further, the nomograph is presented in mixed metric and English units, thus limiting its convenience of use.

C. H. Riesz

Resen, F. L. CATALYST AIR-LIFT SYSTEM. *Oil Gas J.*, **50**, 66-70 (1951) June 28.

The first of 28 air-lift T.C.C. catalytic cracking plants has been on stream since October, 1950. Bead catalyst is raised from the regenerator to the top of the reactor by means of an air-lift. The bead catalyst moves downward, through the reactor where it contacts oil vapors, through a steam purge and then through the regenerator where accumulated carbon is burned with air. Decline of catalyst activity has been abnormally slow and it is anticipated that a high equilibrium activity will be achieved in the air-lift units.

C. H. Riesz

Reynolds, P. M. FACTORS AFFECTING THROUGHPUT IN CAT CRACKING. *Oil Gas J.*, **50**, 95 (1951) June 28.

Essential characteristics of fixed bed, thermofor, and fluid cat cracking problems are summarized.

C. L. Tsaros

Smith, R. B. (assigned to Sinclair Refining Company) PYROLYTIC CONVERSION OF HYDROCARBONS WITH THE AID OF A CATALYST. U.S. 2,556,114 (1951) June 5.

For catalytic conversion of hydrocarbon vapors a fluidized catalyst reactor, a stripping or purging operation and a regenerator are combined within a single shell.

C. H. Riesz

Fischer-Tropsch Synthesis

Keith, P. C. (assigned to Hydrocarbon Research, Inc.) HYDROCARBON SYNTHESIS. U.S. 2,558,760 (1951) July 3.

In the catalytic synthesis of hydrocarbons from

carbon monoxide and hydrogen, a water effluent is obtained which contains small amounts of oxygenated hydrocarbons. This effluent is used to scrub synthesis gas and thereby remove entrained carbon which is ordinarily difficult to eliminate.

C. H. Riesz

Kummer, J. T. and Emmett, P. H. CHEMISORPTION OF CARBON MONOXIDE AND THE HETEROGENEITY OF THE SURFACE OF IRON CATALYSTS. *J. Am. Chem. Soc.* 73, 2886 (1951) June.

Radioactive and non-radioactive carbon monoxide were added in succession to a reduced iron synthetic-ammonia catalyst at −319°F or −108°F. The chemisorbed carbon monoxide was then removed and analyzed for $C^{14}O$. The results indicate that the second fraction of carbon monoxide tends to desorb first except that a partial rapid exchange first occurs equivalent to a coverage of about 50% of the iron surface.

C. H. Riesz

Ruthruff, R. F. HYDROCARBON SYNTHESIS WITH FLUIDIZED CATALYST. U.S. 2,557,842, (1951) June 19.

Synthesis of hydrocarbons from water gas is conducted in a fluidized catalytic reactor. Approximately two-thirds of the water gas is fed into an intermediate point of the fluidized bed, while the remaining one-third is reacted with steam to form carbon dioxide and hydrogen. This portion is scrubbed to remove carbon dioxide and the remaining hydrogen is fed to the bottom of the fluidized bed.

C. H. Riesz

Schlesinger, M. D., Drowell, J. H., Leva, M. and Storch, H. H. FISCHER-TROPSCH SYNTHESIS IN SLURRY PHASE. *Ind. Eng. Chem.* 43, 1474-1479 (1951) June.

Studies were conducted on a "slurry" process for synthesizing hydrocarbons from carbon monoxide and hydrogen (1-to-1 ratio). A finely-divided iron catalyst suspended in process oil was agitated by the up-flowing synthesis gas (0.09-0.2 ft./sec. superficial velocity) and recirculated by natural convection. The effects of reactor temperature (480-530°F), pressure (100-250 psig) and catalyst age on yields and product distribution are presented. Carbon accumulated on the catalyst at the constant rate of 0.0018 lb. per MCF of synthesis gas consumed per lb. of iron in the catalyst after an initial high rate (induction). Conversion of 42% of the inlet carbon monoxide into carbon dioxide is an important factor contributing to low hydrocarbon yields.

C. H. Riesz

Voorhies, A., Jr. and Krebs, R. W. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS PLANT. U.S. 2,556,-861 (1951) June 12.

In the synthesis of hydrocarbons, carbon monoxide and hydrogen are passed into a plurality of fluidized catalyst beds. These are characterized as having catalysts of different process ages. The carbon-forming tendency of aged catalysts is counteracted by increased gas-recycle ratio with the greater catalyst ages.

C. H. Riesz

Ward, C. C., Schwartz, F. G. and Adams, N. G. COMPOSITION OF FISCHER-TROPSCH DIESEL FUEL. *Ind. Eng. Chem.*, 43, 1117-1122 (1951) May.

Fischer-Tropsch diesel fuel captured in the Carrieres Kuhlmann plant at Harnes, France, has been analyzed. The approximate composition was,—paraffins, 88%; polar compounds, 2%; alpha-olefins, 1,5%; olefins other than alpha, 8,5%. The high cetane number, 80, is caused by the high natural paraffin-content of the fuel.

C. H. Riesz

Hydrogenation

Kok, W. J. and Waterman, H. I. PREPARATION OF METALS IN A FINELY DIVIDED STATE FOR USE AS CATALYSTS. *J. Appl. Chem.* (British) 1, 196-198 (1951) May.

Nickel and several alloys were atomized in an acetylene gun, the particles being collected in water. The particles were then treated with acidified hypochlorite solution (5%), washed, dried and reduced. The preparations catalyzed the hydrogenation of hexadecene and of linseed oil. Only nickel or nickel-chrome alloy were effective for benzene hydrogenation.

C. H. Riesz

Weber, G. FLUID HYDROFORMING. NEW PROCESS COMBINES FEATURES OF ORIGINAL FIXED-BED HYDROFORMING, CURRENT FLUID CATALYTIC CRACKING UNITS. *Oil Gas J.*, **50**, 53, 54 (1951) June 14.

The first installation of fluidized hydro-forming has been announced as a joint development by M. W. Kellogg, Standard Oil (Del.) and Standard Oil (N.J.) The first commercial unit processes 2000 bbl./day of naphtha. A molybdena-alumina catalyst forms little carbon so that the regenerator is only one-tenth the size of that used in a comparable fluid catalytic cracking unit. Investment costs are about 60% those of a conventional fixed-bed unit.

C. H. Riesz

Weller, S., and Pelipetz, M. G. COAL HYDROGENATION CATALYSTS. *Ind. Eng. Chem.*, **43**, 1243-1246 (1951) May.

Laboratory coal hydrogenation tests show that intimate and uniform distribution of catalyst with coal is important in increasing catalyst effectiveness. Catalyst activity was highest when impregnated as aqueous solutions, least when added as a powder, and intermediate when the catalyst powder and coal was ball-milled. Tin compounds appear unique in that, at high concentrations, they are as effective in powdered as well as in impregnated form; other catalysts require high dispersion for highest effectiveness.

C. H. Riesz

Wynkoop, R. and Wilhelm, R. H. HYDROGENATION OF ETHYLENE OVER COPPER-MAGNESIA CATALYST. *Chem. Eng. Progress* **46**, 300-310 (1951) June.

The catalytic hydrogenation of ethylene over copper-magnesia catalyst was studied isothermally in the temperature range, 48° to 174°F, space velocities of 1600 to 260,000 vols,/ vol. catalyst-hour, and catalyst particle sizes of 0.04 to 0.11 inches. Kinetic equations were developed for the flow system which, when applied to the experimental data, showed the reaction to be first order with respect to hydrogen. The energy of activation was 2,400 Btu/lb. mole and was unaffected by water poisoning. The theoretical treatment presented applies only to small conversions.

C. H. Riesz

Origin of Petroleum

Barnes, K. B. BACTERIA SERVE AS CATALYSTS IN FORMING HYDROCARBONS, RADIOACTIVITY CONVERTS MATTER INTO OIL, W.P.C. TOLD. *Oil Gas J.* **50**, 56 (1951) June 14.

Very brief statements are made concerning the origin of oil. Zo Bell believes bacterial action on marine sediments to be of great importance in the origin of petroleum. Some bacteria behave quite differently than others. Some reduce organic matter largely to CO_2 and water. Schevenigen and Whitehead believe emanations from the mineral matter in the marine sediments to be very important.

J. D. Parent

Oxo-Synthesis

Smith, W. M. (assigned to Standard Oil Development Co.) CATALYTIC REACTION OF OLEFINS WITH CARBON MONOXIDE AND HYDROGEN. U.S. 2,557,701 (1951) June 19. Temperature in the oxo-synthesis of aldehydes from the interaction of olefins, hydrogen and carbon monoxide is controlled by recycling cooled liquid products after removal of uncondensed gases.

C. H. Riesz

Wender, I., Greenfield, H. and Orchin, M. CHEMISTRY OF THE OXO AND RELATED REACTIONS. IV. REDUCTIONS IN THE AROMATIC SERIES. *J. Am. Chem. Soc.* **73**, 2656 (1951) June.

Aromatic alcohols and ketones were reduced when reacted with hydrogen and carbon monoxide in the presence of dicobalt octacarbonyl catalyst, hydrocarbon products being formed. Previously, it was shown that aliphatic alcohols form homologous alcohols except methanol, which also formed hydrocarbon.

C. H. Riesz

Pipelines

Gibbon, A. FUNCTIONS OF COMMON CARRIER PIPE LINES. *World Oil*, **132**, 64, 66, 70 (1951) May.

Crude oil and products pipe lines transport about one eighth of the total U.S. freight. About 150,000 miles are in existence. There are several types of company or organizations and

ownerships ranging from complete independence of oil companies to complete ownership by integrated oil companies. Lines can function as common carriers, accepting oil and delivering it much in the same manner as a railroad. Regulation is of a different type than applied to natural gas lines. Intrastate movements are covered by state laws and interstate shipments are covered by the tariff and valuation provisions of the Interstate Commerce Bd. A certificate of convenience and necessity for construction and abandonment is not required.

J. D. Parent

Production

Holmgren, C. R. and Morse, R. A. EFFECT OF FREE GAS SATURATION ON OIL RECOVERY BY WATER FLOODING. *J. Petroleum Technology*, 3, 135-140, (1951) May.

The production of oil by water flooding can be substantially increased by the maintenance of free gas saturation in the reservoir during the flooding operation. This effect is accomplished by the alteration of oil relative-permeability characteristics and the occupation by gas of pore space that would otherwise be filled with residual oil. The amount of reduction in residual oil can be calculated from appropriate water-oil relative permeability characteristics. This paper presents experimental data in support of the foregoing conclusions and an example of the calculations. The microscopic pore saturation concepts of the mechanism are discussed. A method of practical application to field floods is presented together with discussion of certain limitations.

Author's Abstract

CARL KING USING COMPRESSED AIR INSTEAD OF MUD IN ATTEMPT TO COMPLETE IN SPRABERRY SAND WITHOUT CONTAMINATING PAY WHY IT'S USED; *Oil Gas J.*, 50, 152 (1951) June 21.

Because the Spraberry sand produces oil primarily from fractures which can be readily plugged with mud, air is being used instead of mud in rotary drilling. The direction is reversed, cuttings being carried up the tubing rather than up the annular space.

J. D. Parent

GEOPHYSICAL COSTS OUTRUN PRICES. *World Oil*, 132, 55-58 (1951) May.

The cost of geophysical exploration has increased greatly in the last few years. Fear is expressed that the quality and quantity of this work will drop unless adjustments can be made.

J. D. Parent

Shale Oil

Guthrie, B. and Klosky, S. THE OIL SHALE INDUSTRIES OF EUROPE. U.S. Bur. Mines Report of Investigations 4776, (1951) May.

Various European oil shale installations were visited. Resources, oil shale assays, mining method, retorting procedures and production data are presented. Scotland is perhaps the main producer, almost 1 million barrels per year of crude shale oil. Sweden's annual production is approximately half of this. France, Germany and Spain have small production rates. Estonia has exceptionally rich oil shale deposits and was the leading European producer in 1938 but its capacity declined under German occupation; its present potential under Russian domination is not known.

C. H. Riesz

Storage

COLLAPSIBLE STORAGE TANK. *World Oil* 132, 236, 238 (1951) June.

A "pillow" type tank made of Buna-N synthetic rubber reinforced with an inner and outer layer of nylon cloth for gasoline storage is described. Successful weathering tests are described.

R. D. Clevenger

Synthesis Gas

Rees, H. V. (assigned to Texaco Development Corp.) PROCESS FOR PRODUCING SYNTHESIS GAS. U.S. 2,552,737 (1951) May 15.

Synthesis gas is prepared from gaseous hydrocarbons by separating the feed gas into a minor portion (e.g. 24% in the case of natural gas) which is mixed with oxygen and is burned in passage through a porous refractory pipe into its interior. Here it meets the major portion of gas which reacts with the carbon dioxide and steam from the combustion and forms carbon monoxide and hydrogen.

C. H. Riesz

Welty, A. B., Jr. (assigned to Standard Oil Development Co.) CONVERSION OF HYDROCARBON GASES TO HYDROGEN AND CARBON MONOXIDE. U.S. 2,550,742 (1951) May 1.

This invention is a fluidized-bed converter having metal oxide and metallic reformer catalyst particles of different particle weights, so that the heavier may be separated centrifugally from the lighter, the metal oxide fraction then properly oxidized in a separate zone, and returned admixed with the metallic catalyst to the conversion zone.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Linden, H. R. PROCESS VARIABLES AND OIL SELECTION FOR HIGH BTU OIL-GAS PRODUCTION. p. 142

Martin, G. A. DUST PROOFING WITH OIL. p. 137

Marshall, D. H. PRODUCTION OF AROMATICS. p. 161

BASIC CHEMICALS DERIVED FROM OIL AND GAS. TOTAL 7 BILLION POUNDS IN 1950. p. 162

Waddill, P. M. METHOD AND APPARATUS FOR CARRYING OUT CATALYTIC REACTIONS WITH MOVING CATALYST. p. 163

7. ANALYTICAL METHODS AND TESTS

Ammonia Properties

Bulkley, W. L. and Swatz, R. H. TEMPERATURE - PRESSURE - CONCENTRATION CHART FOR AMMONIA-WATER SOLUTIONS. *Refrigerating Eng.*, 59, 660-662 (1951) July.

The recently published data of Scatchard have been correlated by the Othmer method. Plots of total pressure and equilibrium vapor composition for the various temperatures and liquid concentrations showed that the experimental data were accurately correlated by straight lines with this method. From these charts, the authors constructed a third chart showing the total pressure and vapor concentration of 0-100% ammonia solutions between the temperatures of —20 and 500° F.

W. E. Ball

Asphalt Analysis

O'Donnell, G. SEPARATING ASPHALT INTO ITS CHEMICAL CONSTITUENTS. *Anal. Chem.* 23, 894-898 (1951) June.

A knowledge of the composition of asphalt on the basis of molecular size and chemical type, comparable to the analysis of the overhead cuts of petroleum, was desired. The method developed involved molecular distillation to yield a size separation; silica gel chromatography to separate saturates, aromatics, and resins; solvent dewaxing of the saturates to determine wax content; urea-complex formation to separate long-chain paraffins; alumina chromatography to separate long-chain paraffins; alumina chromatography to separate monocyclic aromatics; peroxide oxidation followed by chromatography to remove thiophene analogs and thermal diffusion in the liquid state to segregate naphthenes on the basis of ring number. This method of analysis has proved satisfactory for establishing the concentration of paraffins, naphthenes, aromatics, resins, and asphaltenes in an asphalt, as well as their distribution on the basis of molecular size.

Author's Abstract

Fractionation Analysis

Podbielniak, W. J. LOW TEMPERATURE FRACTIONAL ANALYSIS OF LIQUIDS AND GASES. PART II. *Petroleum Refiner*, 30, 145 (1951) May.

This article is second of a series in connection with low-temperature fractional analysis. The first was published in the April, 1951, issue and presented a theoretical investigation of low-temperature fractional analysis apparatus and methods. This article discusses the fundamentals of operating technique, and causes and cure of errors in the operation of the low-temperature fractional distillation apparatus.

M. C. Miyaji

Gas Analysis

Hakewill, H. and Miyaji, M. C. APPARATUS AND METHODS EMPLOYED FOR VOLUMETRIC GAS ANALYSIS AT THE INSTITUTE OF GAS TECHNOLOGY. Paper PC-51-8, Am. Gas Assoc., Prod. and Chem. Conf., New York (1951) May.

The improved volumetric gas analysis apparatus developed by the Institute of Gas Technology is described. Special attention has been devoted to determination of the components of the "Illuminants" group. Data are given to show the accuracy and reproducibility of analyses for different analyzers and different operators on synthetic as well as typical fuel gases. Comparisons of analyses with mass spectrometer results, and of the calculated and actual heating values and specific gravities are discussed.

H. Hakewill

McClendon, E. A. (assigned to Phillips Petroleum Co. APPARATUS FOR DETERMINING A CHEMICALLY REACTIVE GAS. U.S. 2,554,414 (1951) May 22.

An apparatus for continuously and automatically measuring and recording the concentrations of chemically reactive gases, particularly hydrogen sulfide, in gas streams, such as hydrocarbon gas streams, is claimed. In principle this apparatus depends upon photoelectric measurement of reflected or transmitted light from a paper tape moistened with a solution of a sulfide-forming metallic salt and exposed to controlled contact with the gas stream.

H. Hakewill

Vollrath, J. P. (assigned to Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.) GAS ANALYZING APPARATUS. U.S. 2,556,832 (1951) June 12.

Apparatus for providing a steady supply of clean gas to gas analysis equipment is claimed. An electrical filter is employed in conjunction with coordinated means for controlling the flow of sample gas through the analyzing unit.

H. Hakewill

Moisture in Coal

Belcher, R. and Mott, R. A. OBSERVATIONS ON THE INEFFICACY OF A DESICCATOR IN DETERMINING THE MOISTURE IN COAL. *J. Appl. Chem.* (British) **1**, 204-209 (1951) May.

Experiments indicated that moisture is rapidly readsorbed by dried coal, even when covered in a desiccator containing an efficient desiccant. Errors may be reduced to insignificant amounts by providing the coal-dish with a well-fitted cover, and by reducing the cooling period to a minimum.

W. E. Ball

Permeability

Branson, U. S., Jr. MEASUREMENT AND USE OF RELATIVE PERMEABILITY DATA. *World Oil*, **133**, 184, 188-190, 193 (1951) July 1.

A laboratory method of measuring the relative permeability of core samples to oil, gas and water is described. The effect of relative permeability on well and reservoir performance is illustrated diagramatically.

O. T. Bloomer

Petroleum Test Procedures

Smith, H. G. GRAVITY DETERMINATION OF HEAVY PETROLEUM PRODUCTS. *Oil Gas J.*, **50**, 341 (1951) June 21.

A procedure for determining the specific gravity of heavy petroleum fractions by blending with a lighter material of known gravity and proceeding in the standard manner is described. This is a simpler method and is useful where not too much time is available or high accuracy is required.

R. D. Clevenger

Young, Y. C. DETERMINING CLOUD POINT OF DARK DIESEL OIL. *Oil Gas J.* **50**, 115 (1951) June 7.

Part II of an article in two sections presents the procedure for determining cloud point of dark diesel oil with apparatus described in part I. The time of efflux of the oil through a capillary is measured at descending temperatures. The temperature at which the viscosity of the oil begins to exhibit abnormal behavior is the cloud point. Supporting data are given.

R. D. Clevenger

Photometry

Heidel, R. H. and Fassel, V. A. INSTRUMENT FOR INTERNAL STANDARD FLAME PHOTOMETRY. *Anal. Chem.*, 23, 784-788 (1951) May.

A method was sought that would enable the toxicologist to estimate microgram quantities of alkaloids isolated from human tissues in a simple reliable routine analysis. Research has indicated that a relatively simple extraction method can isolate alkaloids from human tissues. The compound isolated is colored and lends itself to a colorimetric method for a quantitative determination. Identification can be made with existing physical methods. A group specific reaction for alkaloids requiring minimal amounts of original material gives a quantitative estimation of the drug concurrent with its detection.

Author's Abstract

Spectrometric Methods

Jamison, N. C., Kohler, T. R. and Koppius, O. G. INFRARED INSTRUMENT FOR INDUSTRIAL PRODUCT CONTROL. *Anal. Chem.* 23, 551-554 (1951) April.

The article describes a double-beam nondispersive infrared instrument which, although originally constructed for control purposes in the synthetic rubber industry, would be very useful for many similar problems in other industries. The paper describes the instrument fully and includes diagrams of the optical and electrical components. The actual performance of the instrument is considered in another article.

J. M. Errington

Koppious, O. G. ANALYSIS OF MIXTURES WITH DOUBLE-BEAM NONDISPERSIVE INFRARED INSTRUMENT. *Anal. Chem.*, 23, 554-559 (1951) April.

The performance of the instrument described by Jamison, Kohler, and Koppius in the previously mentioned paper is discussed in this article. The advantages of nondispersive instruments over those with dispersion are said to be ruggedness, lower costs, and better stability for control purposes. A method for eliminating the absorption of interfering components, therefore making quantitative analysis of mixtures fairly simpler, is described. The potentialities and limitations of this type of instrument are commented upon.

J. M. Errington

Mansfield, W. O., Jr. Fuhrmeister, J. C. and Fry, D. L. SPECTROGRAPHIC DETERMINATION OF HALOGENS AND SULFUR IN ENGINE DEPOSITS. *J. Optical Soc. Am.*, 41, 412-416 (1951) June.

Methods are described for the determination of Br, Cl, S, and Pb in lead-carbon matrices using ordinary spectrographic equipment. One to two milligrams of powdered sample diluted with an equal weight of pure zinc powder are pressed into the end of a pure silver pellet which is sparked against a pure silver counter-electrode. Corrections for background are necessary. By properly blowing helium through the analytical gap during the exposure, background corrections are eliminated and detectability is enhanced. Spectra are shown for comparison. Minimum detectability of the order of 0.05 percent is indicated for qualitative work. Analytical curves covering the concentration ranges 1 to 10 percent for chlorine and sulfur, 1 to 16 percent for bromine, and 25 to 50 percent for lead have been used to analyze engine deposits with an accuracy of $\pm$ 15 percent of the amount present. Excitation conditions are given for two sources (one commercial) as used with two different spectrographs. Lines and line-pairs used are listed.

Author's Abstract

O'Neal, M. J., Jr., and Wier, T. P., Jr. MASS SPECTROMETRY OF HEAVY HYDROCARBONS. *Anal. Chem.*, 23, 830-843 (1951) June.

A study of the mass spectra of C_{14} to C_{32} hydrocarbons was made using a commercial model mass spectrometer modified to resolve molecular weights up to about mass 600, and to enter samples at 300° to 400° C. Preliminary relations between the spectra and molecular structure are given.

D. V. Kniebes

Reynolds, J. G. SOME CRITERIA FOR COMMERCIAL SPECTROMETERS. *J. Inst. Petroleum* (British), 37, 125-146 (1951) March.

Since infrared spectrometers are being widely used, both for control and research purposes, the author suggests that manufacturers of these instruments produce 2 models—one for plant work and one for research work. The plant instrument should be sturdy, fairly simple in its operation, compact and mobile if possible, and

reasonable in cost. In the case of the research model, however, the accent would be on performance and versatility, and it would necessarily be more expensive. The criteria of all the components (i.e., source, cells, detector etc.) of both types are thoroughly discussed, and appropriate suggestions are made. The general requirements of ultraviolet and visible spectrophotometers are also briefly described.

J. M. Errington

Ultimate Analysis

Ogg, C. L., Willits, C. O., Ricciuti, C. and Connelly, J. A. MICRODETERMINATION OF CARBON AND HYDROGEN. *Anal. Chem.* 23, 911-914 (1951) June.

A collaborative study of ultimate analysis procedure was undertaken by twenty laboratories for standardization purposes. The data were analyzed statistically to determine the significance of twelve variables to the accuracy and precision of results. It was concluded that the procedure should include: electric furnaces with mechanical operation, quartz or vycor combustion tubes, a filling of copper oxide plus platinum catalysts and silver wire or ribbon, no choking plug, pressure only for oxygen flow (no aspiration), no wiping of absorption tubes or displacement of oxygen contents with air, and sample weights of more than 10 mg.

W. E. Ball

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Banerjee, S. REACTIVITY OF COKE. p. 139

Hills, D. C. MOISTURE CONTENT OF VARIOUS COKE SIZES. p. 139

Poole, R. APPARATUS FOR DETECTING EXPLOSIVE GASES. p. 165

8. GENERAL AND PHYSICAL CHEMISTRY

Diffusion Mechanism

Crank, J. DIFFUSION IN MEDIA WITH VARIABLE PROPERTIES. PART III—DIFFUSION COEFFICIENTS WHICH VARY DISCONTINUOUSLY WITH CONCENTRATION. *Trans. Faraday Soc.*, (British) 47, 450-461 (1951) May.

Part one of this series dealt with absorption and desorption-time relations; part two dealt with concentration-distance curves and this, the third part deals with diffusion coefficients of this character and considered as extreme examples of concentration-dependence.

J. D. Parent

Danckwerts, P. V. SIGNIFICANCE OF LIQUID-FILM COEFFICIENTS IN GAS ABSORPTION. *Ind. Eng. Chem.* 43, 1460-1467, (1951) June.

The present theory of gas absorption is based on a picture of the absorption mechanism which is probably unrealistic. For many practical purposes this is unimportant, but the theory is likely to be misleading when used to predict the behavior of systems for which no experimental data are available. A more plausible picture of the absorption process is therefore suggested.

The usual assumption of a "stagnant film" of liquid at the interface is abandoned. Instead it is supposed that the surface is continually being replaced with fresh liquid, and a theory of absorption rates is developed on this basis. It appears to agree generally with experience, but it must be regarded as tentative until confirmed experimentally.

If the detailed features of the theory are confirmed, it offers a powerful method of predicting the performance of absorption equipment. Failing this, it may still provide suggestions for a new method of approach to the subject.

Author's Abstract

Furry, W. H. and Pitkanen, P. H. GASEOUS DIFFUSION AS A RANDOM PROCESS. *J. Chem. Physics*, 19, 729-738 (1951) June.

In principal, the diffusion coefficient of a gas may be calculated from a consideration of the random flight of a single molecule in cases

where the concentration of the diffusing gas is low. The present paper is an extension of the method in which the speed and direction of the molecule receive precise treatment. This leads to a value of the diffusion coefficient in agreement with that obtained from the standard Enskog-Chapman treatment. S. Katz

Electro Chemical Conversion

Schlesman, C. H. (assigned to Socony-Vacuum Oil Company) ELECTROCHEMICAL CONVERSION OF HYDROCARBONS. U.S. 2,550,-089 (1951) April 24.

The use of a pulsed electrical discharge to effect the conversion of hydrocarbons is described. Voltages of the order of 350 were used in the experimental work, and pressures well below atmospheric were employed although it is claimed that the process will function at higher pressures. S. Katz

Flame Reactions

Broida, H. P. HYDROGEN-OXYGEN REACTION AT THE SECOND EXPLOSION LIMIT. *J. Chem. Physics*, **19**, 790 (1951) June.

Studies of the second explosion limit of the hydrogen-oxygen reaction point to the role of atomic H and HO_2 as chain-branching intermediates. The destructive influence of various surfaces on these radicals is described.

S. Katz

Coleman, E. H. EFFECT OF METHYL IODIDE AND CHLOROBROMOMETHANE ON THE LIMITS OF INFLAMMABILITY OF n-HEXANE IN AIR. *Fuel* (British) **30**, 114-115 (1951) May.

The inflammability limits of mixtures of methyl iodide and chlorobromomethane with n-hexane in air have been measured and the compositions of limiting safe mixtures have been derived. These inhibitors have been found to be superior to carbon tetrachloride and dichlorodifluorouethane.

D. L. Nicol

Karlovitz, B., Denniston, D. W., Jr., and Wells, F. E. INVESTIGATION OF TURBULENT FLAMES. *J. Chem. Physics* **19**, 541-547 (1951) May.

A new theory of turbulent burning velocity was developed for the case of large scale turbulence, and turbulent burning velocity measurements were carried out. When predictions of the theory were compared with measured burning velocity data, it was recognized that the turbulent flame itself generates turbulence. A mechanism to explain this phenomenon was suggested, thereby permitting calculation of the flame generated turbulence. Available experimental data appear to substantiate this theory.

E. F. Searight

Gas Law Deviations

Bloomer, O. T. A COMPARISON OF THE BEAN AND BURNETT APPARATUS FOR MEASURING GAS LAW DEVIATION FACTORS. Paper PC-51-14, Am. Gas Assoc., Prod. and Chem. Conf., New York (1951) May.

The deviation of the volumetric behavior of natural gases from the ideal gas law is considerable in the range of pressure and temperature commonly used in natural gas transmission. For accurate metering and pressure drop calculations it is necessary to known this deviation. While the deviation factor can often be well estimated from a knowledge of the composition, it is often desirable to determine it experimentally for a particular gas. Two types of equipment have been commonly employed for this purpose in the natural gas transmission industry: One is known as the Bean type and the other as the Burnett type. Both types are based on fundamentally correct principles. In this work the deviations from the ideal gas law of two typical natural gases and pure nitrogen were measured over the pressure range 0-1000 psia. for temperatures of 48.7 and 80.1° F. with both the Bean and Burnett apparatus. The data obtained on each gas with each type of equipment are in excellent agreement ($\pm$ 0.1%). The data obtained on nitrogen with both types of equipment are also in excellent agreement with data in the literature. The selection of the type of equipment to be used can, therefore, be based on the cost, the speed, and simplicity of operation. The Bean type of equipment is the lower priced unit. However, the Burnett type has the advantage of greater speed and simplicity of operation and is more suitable for routine test work.

O. T. Bloomer

Gas: Oil Equilibria

Poettmann, F. H. VAPORIZATION CHARACTERISTICS OF CARBON DIOXIDE IN A NATURAL GAS CRUDE OIL SYSTEM. *J. Petroleum Technology*, 3, 141-144 (1951) May.

The vaporization characteristics of carbon dioxide in a League City natural gas-Billings crude oil system were studied at three temperatures, 38°, 120°, and 202° F and for pressures ranging from 600 to 8,500 psi. Variation of carbon dioxide concentration up to 12 mole per cent in the composite showed no effect on the equilibrium vaporization ratios (K values) of the hydrocarbon constituents or on the K value of carbon dioxide itself. It was shown that carbon dioxide is more soluble in crudes than in distillates which is contrary to the behavior of methane. A working chart of carbon dioxide K values is presented.

Author's Abstract

Low-Pressure Techniques

Martin, S. L. VACUUM TECHNIQUE. SOURCES OF GAS IN VACUUM SYSTEMS AND METHODS OF CONTROL. *Intern.Chem. Eng. and Process Ind.* (British) 32, 221-226 (1951) May.

Precautions against loss of vacuum in glass or metal systems are discussed. Sources of gas include gas from the materials of construction, such as mica, gaskets, etc., or vapor pressures of slightly volatile materials present as parts of the system or dessicant. All materials of construction evolved gas when heated and most organic material including vacuum-joint lubricants contain traces of higher volatity solvents. Other sources of leakage include simple leakage, permeability of materials and the problems of joints, valves and movable seals. The article includes some good drawings of various vacuum valves and concludes with the biography of 44 references.

S. Katz

Tickner, A. W. and Lossing, F. P. THE MEASUREMENT OF LOW VAPOR PRESSURES BY MEANS OF A MASS SPECTROMETER. *J. Phys. and Colloid Chem.*, 55, 733-739, (1951) May.

Vapor pressures of twelve gases were measured in the range of 0.001 to 10.0 mm. with temperatures as low as —225.0° C. in the case of methane. The effect of impurities was circumvented by using a mass spectrometer to measure the partial pressure of the gas being studied.

D. V. Kniebes

Pyrometry

Gibson, A. F. A TWO-COLOUR INFRA-RED RADIATION PYROMETER. *J. Sci. Instruments* (British) 28, 153-155 (1951) May.

The ratio of the radiated energy in two wavelength bands received from a hot body is a measure of the body's surface temperature. As only a ratio is involved the measurement is independent of the emissivity of the body if this does not vary with wavelength over the used range, distance of the body from the source, time exposure, etc. The pyrometer described employs the above principle with a PbS photoconductive cell being used for radiation detection. A suitable amplifier is used to measure the a. c. signal generated by the PbS cell. By proper calibration the measured ratio of radiated energies can be converted to read directly in terms of temperature. Temperatures down to 400° F may be measured with an accuracy of ± 5° F. The limiting lower-temperature-level factor is noise, which decreases accuracy to ± 45° F at 300° F.

D. L. Nicol

Radioactivity

Anderson, E. C., Arnold, J. R. and Libby, W. F. MEASUREMENT OF LOW LEVEL RADIOCARBON. *Rev. Sci. Instruments*, 22, 225-230 (1951) April.

Techniques are described for chemical purification and measurement of radio-carbon at natural levels (10^{-12} curie/g or less). The chemical cycle has the following steps: (1) conversion of the starting material to carbon dioxide, by combustion or hydrolysis, (2) precipitation as calcium carbonate, followed by evolution of the purified carbon dioxide, (3) reduction to elementary carbon with magnesium turnings, and (4) extraction with hydrochloric acid and water to remove magnesium and magnesium oxide. The over-all yield is about 85 percent, based on the carbon in the original sample. The counting is done in a screen-wall counter, twenty-four inches long, with an eight-inch effective counting length. The sample (about 8.5g) is mounted

uniformly in an "infinitely thick" layer, on a split cylinder which can be shifted from "sample" to "background" position by sliding from end to end of the counter. An argon-ethylene filling is used. The background of the counter (about 400 cpm, unshielded) is reduced to 4.5 cpm by the use of an eight-inch thick iron shield and eleven anti-coincidence counters, eighteen inches long. The calibration of the counter on an absolute basis is described. Its efficiency for a 20 mg/cm^2 layer of carbon, over a 400 cm^2 area, is 5.46 $\pm$ 0.03 percent.

Author's Abstract

Paneth, F. A. RADIOACTIVE STANDARDS AND UNITS. *Nucleonics*, 8, 38-41 (1951) May.

Radioactive standards have been redefined to sever any special connection with radium and radar. The curie is now defined as the quantity of a radioactive nuclide which produces 3.700 x 10^{10} disintegrations per second. Specifications with regard to absolute standards are also debated.

S. Katz

Reaction Mechanisms

Denbigh, K. G. THE KINETICS OF CONTINUOUS REACTION PROCESSES: APPLICATION TO POLYMERIZATION. *J. Appl. Chem.* (British) 1, 227-236 (1951) May.

The kinetics of reaction processes are discussed with reference to (1) batch (2) tubular and (3) tank reactions. Equations governing the conversions are developed and a number of special cases are given consideration. These include translation of batch mole experimental data to tubular or tank production processes, the effects of interreaction and the treatment of the temperature variable.

S. Katz

Laidler, K. J. and Shuler, K. E. ELEMENTARY REACTIONS IN THE GAS PHASE INVOLVING EXCITED ELECTRONIC STATES. *Chem. Revs.*, 48, 153 (1951) April.

Electrically excited molecules may appear either as reactants or products of an elementary reaction. Their importance is well established in an understanding of such phenomena as the mechanism of combustion and photochemical reactions. The present review clarifies reaction types and examines reaction mechanisms and kinetics from a consideration of potential surfaces and rate equations. Methods of producing excited species are described, including photochemical and chemical processes and inelastic collision. Finally unimolecular and bimolecular reactions are considered. A bibliography of 231 references is included.

S. Katz

Field, F. H. A NEW CALCULATION OF THE LATENT HEAT OF SUBLIMATION OF CARBON AND THE FIRST C-H DISSOCIATION ENERGY IN METHYLENE FROM ELECTRON IMPACT DATA. *J. Chem. Physics*, 19, 793 (1951) June.

From a consideration of the energies included in the mass spectrometric dissociation of methane it is concluded that the heat of atomization of methane is 357 kcal/mole and the heat of sublimation of carbon is 135 kcal/mole.

S. Katz

Statistical Methods

Mosteller, F. THEORETICAL BACKGROUNDS OF THE STATISTICAL METHODS. UNDERLYING PROBABILITY MODEL USED IN MAKING A STATISTICAL INFERENCE. *Ind. Eng. Chem.*, 43, 1295-1297 (1951) June.

Statistical concepts of value to the chemist and engineer are considered. The paper discusses the statistical approach to the testing of hypotheses, and considers the null hypotheses, significance level, power and regression.

S. Katz

Scheffé, H. THEORETICAL BACKGROUNDS OF THE STATISTICAL METHODS. SOME BASIC CONCEPTS OF PROBABILITY AND STATISTICS. *Ind. Eng. Chem.*, 43, 1292-1294 (1951) June.

Some basic thorems and axioms are outlined without rigorous proof. Topics discussed include probability, statistical independence, random variables, population sampling and statistical control. Illustrative type cases render the paper a valuable introductory treatment.

S. Katz

Surface Area Studies

Carman, P. C. and Malherbe, P. le R. ROUTINE MEASUREMENT OF SURFACE OF

PAINT PIGMENTS AND OTHER FINE POWDERS. II. *J. Applied Chem.* (British) **1**, 105-108 (1951) March.

Comparisons were made of surface areas of various finely divided materials using surface area, air permeability and the electron microscope. Spheres of 3-microns diameter usually yield comparable results by all these methods. Below 0.1 microns, agreement between permeability and adsorption is good, exceptions usually occurring where porosities are suspected. For very fine particles, helium permeabilities are preferable to air.

S. Katz

Halsey, G. D., Jr. A NEW MULTILAYER ISOTHERM EQUATION WITH REFERENCE TO SURFACE AREA. *J. Am. Chem. Soc.*, **73**, 2693-2700 (1951) June.

London's Law for the forces leading to multilayer adsorption has been used with some assumption to derive multilayer adsorption isotherms. These isotherms may be used to compute areas comparable with those derived by the BET methods. Other applications of the isotherms are discussed.

S. Katz

Jones, W. M. MOBILITY IN A SORBED LAYER. *Trans. Faraday Soc.* (British) **47**, 381-392 (1951) April.

A gas adsorbed at a solid surface may be treated as a two-dimensional fluid. Theoretical equations are derived for the flow of such a gas through a hole in a plane, a capillary and a porous surface. The application of these equations to experimental data are considered and it is shown that in the processes of flow of gases through fine capillaries, three terms must be considered (I) Poiseuille flow (II) Knudsen flow and (III) the flow of sorbed molecules over the capillary surfaces.

S. Katz

Milligan, W. O., Simpson, W. C., Bushey, G. L., Rachford, H. H. and Draper, A. L. PRECISION MULTIPLE SORPTION-DESORPTION APPARATUS. *Anal. Chem.*, **23**, 739-741, (1951) May.

A gravimetric method of studying adsorption-desorption phenomena between — 20 and + 60° C. is described. Quartz-spiral balances of the McBain-Baker type are used to support the adsorber and the adsorption is measured directly by the displacement of the spiral. Temperatures are measured to 0.001° C. and pressures are determined to 0.007 mm. Hg. Extreme rapidity is claimed for the method. S. Katz

Ultrasonic Absorption

Beyer, R. T. THE CONTRIBUTION OF THERMAL CONDUCTIVITY TO THE ULTRASONIC ABSORPTION COEFFICIENT IN LIQUEFIED GASES. *J. Chem. Physics*, **19** (1951) June.

Calculated ultrasonic absorption coefficients of liquid A, O_2, N_2 and H_2 from the shear-viscosity measurements accounted for about three-fourths of the experimentally observed values. The author showed that by adding the contribution of the thermal conductivity effect to the shear-viscosity effect, a better agreement between the calculated and the observed was obtained.

S. Mori

Vapor-Phase Reaction Time

Pattison, J. N. NOMOGRAPH FOR CALCULATING CONTACT TIME FOR VAPOR-PHASE REACTIONS. *Ind. Eng. Chem.*, **43**, 1444-1446 (1951) June.

The advantages of the contact time for use in the calculations of vapor-phase reactions over feed rates and space velocity are pointed out. In the present paper a nomograph is presented for the determination of contact time based on the average of the gases in and out. An example is included.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bean, H. S. CORRECTION FACTORS FOR THE BALANCING EFFECT OF GAS IN ONE LEG OF A MANOMETER. p. 165

Malherbe, P. le R. MICROSTRUCTURE OF SOME SOUTH-AFRICAN COALS. p. 138

Rapson, W. E. SOUTH-AFRICAN NATIONAL CHEMICAL RESEARCH LABORATORY. p. 138

Tsien, H. S. INFLUENCE OF FLAME FRONT ON THE FLOW FIELD. p. 136

9. ORGANIC CHEMISTRY

Acetylene Production

Hasche, R. L. (assigned to Eastman Kodak Company.) APPARATUS FOR PRODUCING ACETYLENE. U.S. 2,556,424 (1951) June 12. An apparatus for converting saturated hydrocarbons into acetylene by means of a regenerative process is described.

C. H. Riesz

Heat-Transfer Medium

Wiener, T. (assigned to California Research Corp., San Francisco, Calif.) PROCESS FOR REMOVING FREE PHENOL FROM TETRA-ARYL ORTHOSILICATE. U.S. 2,555,721 (1951) June 5.

The presence of free phenols in the tetra-aryl orthosilicates, which are used as high-boiling, heat transfer media, is objectionable because of toxicity and lowered boiling point. Such effects of phenols are eliminated by addition of carboxylic-acid anhydrides (phthalic, succinic, benzoic) and heating, which converts the phenols to higher-boiling compounds.

O. P. Brysch

High Molecular Weight Aromatics

Baker, W., McOmie, J. F. and Norman, J. M. EIGHT- AND HIGHER-MEMBERED RING COMPOUNDS. PART IV. DI-m-XYLYLENE, TRI-p-XYLYLENE, AND NEW SYNTHESES OF PYRENE AND OF CORONENE. *J. Chem. Soc.* (British), 1114 (1951) April.

The synthesis of di-m-xylylene and of tri-p-xylylene and their conversion into pyrene and coronene are described.

C. H. Riesz

Baker, W., Glockling, F, and McOmie, J. F. W. EIGHT AND HIGHER-MEMBERED RING COMPOUNDS. PART V. DI-(NAPHTHALENE-2:7-DIMETHYLENE) AND ITS CONVERSION INTO CORONENE. *J. Chem. Soc.* (British) 1118 (1951) April.

Synthesis of coronene in a three-step procedure from 2:7-dimethylnaphthalene occurred with 4% yield.

C. H. Riesz

Bannister, B. and Elsner, B. B. THE SYNTHESIS OF HYDROCARBONS OF HIGH MOLECULAR WEIGHT. PART I. MONO-ALKYLNAPHTHALENES. *J. Chem. Soc.* (British) 1055, (1951) April.

Alkylnaphthalenes with side chains containing 8, 10, 12 and 18 carbon atoms were prepared and their physical constants were determined.

C. H. Riesz

Bannister, B. and Elsner, B. B. THE SYNTHESIS OF HYDROCARBONS OF HIGH MOLECULAR WEIGHT. PART II. SOME DI- AND TRI-N-ALKYLNAPHTHALENES. *J. Chem. Soc.* (British) 1061 (1951) April.

The syntheses of three di-n-hexylnaphthalenes and one tri-n-butylnaphthalene are described.

C. H. Riesz

Mellitic Acid

Howard, H. C. (assigned to Carnegie Institute of Technology) PROCESS OF MAKING ORGANIC ACIDS FROM CARBONACEOUS MATERIAL. U.S. 2,555,410 (1951) June 5.

In the production of organic acids (such as mellitic) from coal by oxidation with nitric acid at about 100° C. and normal pressures, 20 to 50% of the carbon is converted to dioxide, and large amounts of nitric acid are consumed. These difficulties may be minimized by carrying out the reaction at an oxygen partial-pressure of 100 to 1000 psi.

W. E. Ball

Organic Sulfur Compounds

Appleby, W. G., and Sartor, A. F. (assigned to Shell Development Co.) THIOPHENE PRODUCTION FROM HYDROGEN SULFIDE AND MONO-OLEFIN. U.S. 2,558,508 (1951) June 26.

The interaction of an olefin such as butylene with hydrogen sulfide to form thiophene is catalyzed by iron sulfide.

C. H. Riesz

Gamson, B. W. (assigned to Great Lakes Carbon Co.) PROCESS FOR PRODUCTION OF CARBON DISULFIDE. U.S. 2,556,176; 2,556,177; 2,556,178; (1951) June 12.

These 3 patents utilize the fluidized-bed process to produce carbon disulfide by the reaction of reactive carbonaceous particles and sulfur vapor at 1100 to 1800°F., by respectively using as the carbonaceous material (1) a previously

prepared carbon-sulfur-hydrogen solid calcined at 1600° F.; (2) an atomized liquid mixture of heavy hydrocarbon (oils, tars) and elemental sulfur to form the sulfo-carbon solid in an associated but separate fluidized zone and (3) the liquid sulfur-carbon mixture passed as discrete droplets directly to the reaction zone. In each case, hydrogen sulfide, sulfur vapor and CS_2 are fractionated from the vapor product of the reaction zone, the former two being returned as such to the zone, or the H_2S converted by partial oxidation to sulfur and recycled.

O. P. Brysch

Komarewsky, V. I. and Knaggs, E. A. HYDROGENOLYSIS OF THIOPHENE OVER VANADIUM OXIDE. *Ind. Eng. Chem.* **43**, 1414-1418 (1951) June.

The catalytic decomposition of thiophene in an atmosphere of pure hydrogen was investigated at atmospheric pressure, at temperatures of 350° and 400° C., and at liquid hourly space velocities ranging from 0.02 to 0.2, employing a pure vanadium oxide catalyst. At the lowest space velocity 67% of the thiophene-sulfur charged was converted to H_2S; while at the highest space velocity only 25% was converted. Other reaction products formed included butane, butene, butadiene, and traces of mercaptan. A stepwise reaction mechanism proceeding from thiophene to mercaptan to butadiene and H_2S to butene and finally to butane was postulated. Further work demonstrated the possibility of 74% desulfurization of benzene containing 5% thiophene at 400° C. and 0.2 space velocity with mole ratios of thiophene-benzene-hydrogen of 1:18:10, respectively.

H. Hakewill

Kreuz, K. L. (assigned to The Texas Co.) THIOPHENE PREPARATION FROM HYDROCARBON AND SULFUR DIOXIDE. U.S. 2,557,664 (1951) June 19.

Thiophene is prepared by passing sulfur dioxide and a hydrocarbon containing 4 to 10 carbon atoms in a ratio of 0.3 at a space velocity of 0.3 to 5, over a dehydrogenation catalyst (Group VI metal and metalloid oxides, sulfides and mixtures) at 700 to 1400° F.

O. P. Brysch

Owen, A. J., Sykes, K. W. and Thomas, J. D. THERMODYNAMICS OF CARBON DISULPHIDE SYNTHESIS. EQUILIBRIUM IN SOME REACTIONS INVOLVING HYDROGEN SULPHIDE, SULPHUR DIOXIDE, CARBON DIOXIDE AND CARBON. *Trans. Faraday Soc.* (British) **47**, 419-427 (1951) May.

Conversion of H_2S or SO_2 to CS_2 have been studied thermodynamically for the following systems:

(1) $CO_2 + 2\ H_2S$, (2) $CO_2 + 2H_2S + C$,
(3) $2\ H_2S + C$, (4) $SO_2 + C$.

Their equilibrium mixtures for the four systems were calculated at 1000, 1200, and 1400° K and tabulated. The amount of heat absorbed for each system per mole of CS_2 obtained also has been calculated at these temperatures. It is brought out that these results are only equilibrium values and may not necessary agree with the experimental since the field of kinetics is quite independent of thermodynamics.

S. Mori

Partington, J. R. and Neville, H. H. THE THERMAL DECOMPOSITION OF CARBONYL SULPHIDE. *J. Chem. Soc.* (British) 1230-1236 (1951) May.

The equilibrium decomposition of carbonyl sulfide to form carbon dioxide was found to be dependent upon the nature of the reaction vessel. In the presence of silica 36% decomposition was obtained after 4 hours contact at 450° C. The equilibrium decomposition of carbonyl sulfide to form carbon monoxide was studied at four temperatures between 500 and 650° C. At the highest temperature 22% decomposition was obtained after 10 minutes contact. Reaction-rate measurements of both reactions were made under various conditions.

C. E. Hummel

Petrochemicals

Marshall, D. H. PRODUCTION OF AROMATICS. *Chem. Eng. Progress* **46**, 313-318 (1951) June.

The Baytown (Texas) Ordnance Works for the production of nitration-grade toluene from petroleum is described. Naphtha fractions are hydroformed, the product also is fractionated, and the toluene cut refined first with liquid sulfur dioxide and then sulfuric acid. In the post-war period, operations have to be modified to obtain a variety of products including toluene, xylenes, C9-aromatics and C10-aromatics.

C. H. Riesz

BASIC CHEMICALS DERIVED FROM OIL AND GAS TOTALED NEARLY 7 BILLION POUNDS IN 1950, HALF AGAIN AS MUCH AS IN 1949. *Oil Gas J.* 50, 55, 56 (1951) June 14.

Petrochemical manufacture increased to nearly 7 billion lbs. in 1950, a gain of nearly 30% over 1949. The sales value was about $145,000,000. Petrochemicals are derived from petroleum and natural gas, but the relative amounts of these raw materials are not given in these U.S. Tariff Commission figures.

J. D. Parent

Synthetic Phenol

MORE PHENOL, NEW PROCESS. *Chem. Week*, 68, 11 (1951) June 23.

Producers in the past have had to choose between sulfonation and chlorination to affix a hydroxyl group to the benzene ring. A newer variation involves the use of air and hydrogen chloride instead of elemental chlorine. Barrett's new plant will employ the hyperoxide process, thus avoiding shortages of sulfur and chlorine. The benzene is alkylated with propylene to cumene, which is oxidized with air to cumene hyperoxide, subsequently converted to a mixture of acetone and phenol.

W. E. Ball

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bondy, H. F. THE IMPROVEMENT OF EFFLUENT LIQUORS. p. 141

Grand, J. A. SOLID FUEL. p. 137

Wall, L. A. PYROLYSIS OF MIXTURES OF ETHANE AND ETHANE — d_6[1]. p. 143

10. CHEMICAL ENGINEERING

Absorption Equipment

Love, F. G. (assigned to Packaged Gas Equipment Corporation.) GAS SCRUBBER. U.S. 2,551,890 (1951) May 8.

The patent describes a new-type gas scrubber for large capacity high-pressure service. The inventor claims very little entrainment of scrubbing liquid in the pure gas. This is accomplished by an arrangement of cyclone separators within the scrubber. The inventor claims minimum entrainment losses and minimum pressure drops.

W. G. Bair

Stephens, E. J. and Morris, G. A. DETERMINATION OF LIQUID-FILM ABSORPTION COEFFICIENTS. *Chem. Eng. Progress* 47, 232-242 (1951) May.

A laboratory-scale column which has the same characteristics as that of a packed column has been developed, so that data for gas- and liquid-film coefficients may be obtained. A procedure and analysis of a mechanism where both the rate of diffusion through a liquid film and the rate of chemical reaction are contributing factors is presented, whereby the liquid-film coefficient and the reaction-rate coefficient may be calculated.

S. Mori

Cooling Towers

Lichtenstein, J. RECIRCULATION IN COOLING TOWERS. *Refrig. Eng.*, 59, 474-477 (1951) May.

Recirculation can be defined as an adulteration of the atmosphere entering a cooling-tower by a portion of the atmosphere leaving the tower. It is a characteristic of the surroundings of a cooling-tower installation and affects the cold-water temperature. It must either be suppressed, at least partially, or considered in the dimensioning of the required equipment. Methods of calculation of a new tower, cold-water temperature change with recirculation and tower-size increase with recirculation are outlined.

C. L. Tsaros

Fluid Flow

Heiss, J. F. and Bramer, H. C. CUT OUT

TRIAL-AND-ERROR. *Chem. Eng.*, 58, 112-114 (1951) June.

This article develops a method whereby the trial-and-error calculation of the unknowns in pipe systems can be eliminated. The procedure involves the evaluation of the friction factor, f, by Genereaux's equation:

$$f = 0.04\ (Nre)^{-0.16}$$

and is only applicable to the study of the flow of incompressible fluids in relative short lengths of new steel or cast-iron pipe. Nomographs are presented for the solution of the equations developed. B. E. Hunt

Jorissen, A. L. DISCHARGE MEASUREMENTS BY MEANS OF VENTURI TUBES. *Trans. Am. Soc. Mech. Engrs.*, 73, 403- 411 (1951) May.

An attempt is made to present a comprehensive idea of the actual stage of development of the method of flow measurement by means of Venturi tubes. Use has been made here of (a) the latest available American and European Standards, published by the various national associations: The American Society of Mechanical Engineers, 1937; Ente nazionale per l'Unificazione nell' Industria, 1938; British Standards Institution, 1943; Verein deutscher Ingenieure, 1948; Association francaise de Normalisation, 1949; (b) the decisions taken at the international meetings of the Committees of Flow Measurement: ISA 30, Helsinki, 1939; ISO 30, Paris, 1948; (c) published research reports. Both the nozzle-type and the Herschel-type Venturi are discussed from the viewpoints of discharge coefficient and pressure losses. The conclusions point out the need of further research and the necessity of an international standardization.

Author's Abstract

Gas-Solids Heat Transfer

Hougen, J. O. and Piret, E. L. EFFECTIVE THERMAL CONDUCTIVITY OF GRANULAR SOLIDS THROUGH WHICH GASES ARE FLOWING. *Chem. Eng. Progress*, 47, 295-303 (1951) June.

Extensive data obtained on the cooling of air during downward flow through radially cooled beds of granular solids were analyzed by means of the classical equations for unsteady transfer of heat by conduction and the results interpreted as effective thermal conductivities of the granular beds. The solids investigated included five sizes of Celite cylinders, and two sizes of spherical Celite pellets. Flow rates covered a 50-fold range in mass velocity, from 75 to 3700 lbs./hr./sq. ft., and initial air temperature were measured The cooling water around the tube was maintained near 60° F. Exhaustive studies of two sizes of cylindrical beds were made and some data on two other sizes were collected. Bed dimensions varied from 3.75 in. in diameter and 12.5 in. long to 1.37 in. in diameter and 6.43 in. long. A generalized correlation for the thermal conductivity data was developed. Conductivities for the air-Celite systems varied from 0.30 to 2.30 B.t.u./hr./sq. ft./°F/ft. in the range of variables studies. These values are from 20 to 100 times that of the fluid in the static state and from 2 to 15 times as great as the solid itself.

Author's Abstract

Waddill, P. M. and Fowler, F. C. (assigned to Phillips Petroleum Co.) METHOD AND APPARATUS FOR CARRYING OUT CATALYTIC REACTIONS WITH MOVING CATALYST. U.S. 2,555,210 (1951) May 29.

This invention comprises a pebble heater for vapor-phase chemical reactions in which a mixture of two different types of pebbles are gravitated through the reaction zone,—a heavy highly catalytic pebble and a less heavy highly refractory pebble,—the former separating at a lower level in the recirculating gas-lift and the latter carrying upward to the reheating zone. The two types of pebbles are continuously remixed at the base of the reheater.

O. P. Brysch

Gas-Velocity Pulverizer

Tanner, H. G. APPARATUS AND METHOD TO COMMINUTE SOLID PARTICLES IN GAS. U.S. 2,552,603 (1951) May 15.

A new process for comminuting solid particles utilizes a highly turbulent gas stream for the actuating fluid. Particles about 20-mesh or less in size are fed by suitable means such as a vibrating hopper into a temperature-controlled pulverizing chamber composed of a polished, high-speed, rotating disc inside a close-clearance housing. Pulverization is achieved by virtue of the high velocity or energy-gradient in

the annulus between rotor and housing, causing tensive forces in excess of the cohesive forces in the solid particles. Peripheral rotor speeds of the order of 100 fps and clearances of 0.01 to 0.12 in. are recommended for production of pulverized material less than 10 microns in size. The principal advantages claimed for the system are that (a) it is amenable to exact temperature control (b) low ratios of gas to solid (on the order of 0.2 lb/lb solid) permits use of expensive inert or other chemical atmospheres to be used for treating the solids and (c) brittle, soft and labile materials may be handled.

C. v. Fredersdorff

Heat Transfer

Widell, T. HEAT TRANSFER WITH SUPERHEATED STEAM. *Eng. Digest*, (British) 12, 191, 192 (1951) June.

Using an equation based on recent heat transfer studies by McAdams, Kennel and Addoms, and values for the heat conductivity of steam determined by Keyes and Sandell, a practical equation is derived. Heat transfer coefficients were calculated for 20, 40, 80 and 150 bars (1 bar = 74.5 mm of mercury) in the temperature range 450 to 550° C. These values are compared with values calculated by Schack and ten Bosch.

C. L. Tsaros

Ore Reduction

Gilliland, E. R. (assigned to Standard Oil Development Co.) METALLURGICAL PROCESS. U.S. 2,557,650 (1951) June 19.

A process is described for the simultaneous reduction and smelting of metal ores. The ore and reducing agent, solid or gaseous, are introduced into the molten slag layer of an open-hearth furnace. The slag is circulated through a heating zone, where it picks up enough heat for reduction and melting.

W. E. Ball

Gilliland, E. R. (assigned to Standard Oil Development Co.) APPARATUS FOR CONDUCTING METALLURGICAL PROCESS. U.S. 2,557,651 (1951) June 19.

Claims are made for apparatus to carry out the process described in U.S. 2,557,650. The principal elements are a reducing chamber, settling chamber, and a heating chamber in an open-hearth type furnace.

W. E. Ball

de Marchi, V. S. (assigned to Institute of Gas Technology. METHOD OF CONCENTRATING THE IRON CONTENT OF IRON ORES. U.S. 2,557,059 (1951) June 10.

A method is presented for concentrating the iron content of an ore material containing magnetite, hematite and silica closely interlocked with the iron oxides. The iron ore is first pulverized to a relatively fine particle size, such as 100-mesh and then partially or completely reduced by a reducing atmosphere of hydrogen, or mixtures of hydrogen and carbon monoxide or by finely divided carbonaceous materials at temperatures of 1100 to 1700° F. but preferably above 1200° F. The reduced product, after cooling in the reducing atmosphere, undergoes a preliminary separation either by simple screening with for example a 100-mesh screen or by dry magnetic separation or other mechanical methods. The ferruginous or magnetic fraction is pulverized to pass a 325-mesh sieve and subjected to a wet magnetic separation yielding a magnetic fraction containing approximately 2% silica. The total iron recovery usually exceeds 75% and may reach 90% or higher.

C. v. Fredersdorff

Piping

Stothart, E. W. THE SELECTION OF PIPE SUPPORTS. *Combustion*, 22, 39-43, (1951) May.

The author discusses the location of hangers and anchors, determination of pipe movement, hanger types, thermal deflections, piping attachment, sprung hangers, sway braces and vibration dampeners, and calculation of hanger loads.

J. J. Guyer

Pressure Vessels

DESIGN AND MANUFACTURE OF PRESSURE VESSELS. *Intern. Chem. Eng. Process Ind.* (British), 32, 111-115 (1951 March.

A summary is presented of the British Standard 1500/1949 which covers details of the design of pressure vessels including design stresses, preparation for welding, certification and qualification.

C. v. Fredersdorff

Refrigeration Design

Michel, E. R. REFRIGERATION DESIGN

CONSIDERATIONS BELOW —20 F. *Refrig. Eng.* 59, 552-556, 606 (1951) June.

Design consideration for refrigeration system operating below —20° . are outlined. Most of the discussion dials with systems operating on ammonia and Freons 11 and 22 (lower limit —100° F). Systems operating to —200°F. which use hydrocarbon and Freon 13 and 14 are briefly mentioned. Many special problems which must be considered in low temperature such as load calculation, low evaporating pressure, hazards, etc. are discussed.

O. T. Bloomer

Waste-Heat Recovery

Patterson, W. S. (assigned to Combustion Engineering-Superheater, Inc.) WASTE HEAT BOILER FOR NATURAL GAS PROCESSING SYSTEMS. U.S. 2,552,505 (1951) May 8.

The inventor claims a new type waste-heat boiler for producing process steam from natural gas processing systems. The boiler will operate directly on the reaction gases and was designed for 2500° F. and 300 psig. The boiler also serves to cool the reaction gases. The fire tubes consist of return bends concentrically arranged with the cylindrical wall of the boiler. They are fed by replaceable metering-orifice devices to insure even distribution throughout the tube bank. They discharge into a steam chest located on top of the tube-bundle.

W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brown, C. A. GAS CLEANING MEDIA FOR CLEANING DUST AT REGULATING STATIONS. p. 143

Danckwerts, P. V. SIGNIFICANCE OF LIQUID-FILM COEFFICIENTS IN GAS ABSORPTION. p. 155

Sproul, W. T. PRECIPITATORS STOP DUST AND FUMES. p. 139

Sproul, W. T. OPERATION OF COTTRELL PRECIPITATORS. p. 140

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Flow Control

Catheron, A. R. FACTORS IN PRECISE CONTROL OF LIQUID FLOW. *Instruments*, 24, 705-710, (1951) June.

Recent developments of more delicate flow-rate indicators necessitates a need for a quicker response flow-controller. A study of a typical liquid flow system using pneumatic-type controllers and indicators, showed that the greatest lag was found in the air tubing in the transmission lines and the air head in the motor valves. The former could be lessened by shortening the length of line and the latter by using a volume booster.

S. Mori

Gas Detectors

Poole, R. APPARATUS FOR DETECTING EXPLOSIVE GASES. U.S. 2,557,008 (1951) June 12.

Improved design is claimed for explosimeters of the type employing an electrically-heated filament as a part of a bridge circuit.

H. Hakewill

Gas Meters

Bickel, J. W. and Reding, J. A. REMOTE REGISTER FOR GAS METERS. U.S. 2,553,-842 and 2,553,843 (1951) May 22.

An auxiliary indicating register for a gas meter is proposed, which operates from the rotating shaft of the primary indicator, and may be mounted outside of the building for the meter-readers' and customer's convenience. The meter rotor mechanism imparts a reciprocating motion to an auxiliary slide-rod. This motion is transmitted to the pawl and ratchet mechanism of the auxiliary index, in the first invention by bellows connected by sealed conduit and in the second invention by slide-rods connected by a flexibly-shielded operating wire (Bowden wire).

O. P. Brysch

Manometry

Bean, H. S. and Morey, F. C. CORRECTION FACTORS FOR THE BALANCING EFFECT OF A GAS IN ONE LEG OF A MANOMETER. *Instruments*, 24, 528,529 (1951) May; *Oil Gas J.*, 50, 107-113 (1951) July 17.

An equation has been developed to show (1) the balancing effect of the column of gas in the

high pressure side of the manometer, (2) difference in elevation between the differential pressure source and manometer, and (3) difference in densities of gas in the two pressure connections due to large differences in the pressures and temperatures. D. C. Gami

Honick, K. R. A NULL METHOD MERCURY CISTERN MANOMETER. *J. Sci. Instruments* (British), 28, 140-142 (1951) May.

A mercury cistern manometer designed to be observed by a null method is described. The instrument is suitable for the measurement of pressures over the range ± 1 atm to within 0.01 in. The null method eliminates the need for contracted scales and consistency of bore; and dismantling, cleaning and replacement of components can be performed without recalibration. Only one short length of glass tubing is used in the construction and the instrument is readily transportable. An advantage is that the manometer is always observed at the same fiducial point. Author's Abstract

Pressure Vents

Olson, H. E. (assigned to Union Carbide and Carbon Corp.) MANIFOLD SYSTEM FOR AUTOMATICALLY VENTING AND IGNITING COMBUSTIBLE GAS ESCAPING FROM HIGH-PRESSURE COMPRESSED-GAS CONTAINERS. U.S. 2,557,199 (1951) June 19.

A system is described for automatically venting and igniting hydrogen escaping in a manifold connecting to high pressure safety relief valves. The essential feature is a catalyst element that ignites a pilot which in heating a bi-metallic element causes a flame shield to move into position to prevent damage of the catalyst by overheating. The device might be used in interstate rail shipment of hydrogen cylinders.

C. H. Riesz

Temperature Control

Strange, C. H. (assigned to Elsa L. Strange.) SWITCH FOR KILNS OR OVENS. U.S. 2,555,864 (1951) June 5.

A cutoff switch device using a pyrometric cone as the temperature controller in a high-temperature kiln is described. The author claims this type to be superior to the thermocouple-type controller, since the latter is unreliable when a precise critical temperature is to be obtained.

S. Mori

Thermocouple

Schedlovsky, T. (assigned to the United States of America as represented by the Secretary of the Navy) THERMOCOUPLE THERMOMETER. U.S. 2,559,571 (1951) July 3.

A multiple-junction thermocouple for use in high-velocity gas streams is described. The thermocouples are arranged to neutralize temperature errors due to gas compression.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Jorissen, A. L. DISCHARGE MEASUREMENTS BY MEANS OF VENTURI TUBES. p. 163

12. MATERIALS OF CONSTRUCTION

Aluminum

Kerns, W. W. and Baker, W. E. USE OF ALUMINUM IN PETROLEUM REFINERY EQUIPMENT. *Petroleum Refiner* 30, 123-129 (1951) May.

Aluminum is of considerable interest as a material of construction for the petroleum industry. This interest is due to its corrosion resistance, light weight, good heat transfer characteristics, and low cost. Since aluminum is anodic to many other materials of construction care must be exercised in the design of installations. Several actual refinery installations in tanks, exchangers, instrument tubing and insulation waterproofing are reviewed. Aluminum is indicated as an economical construction material for the petroleum industry.

B. E. Hunt

Baryte Pipe Coatings

Love, F. H. USE OF BARYTES ON PIPE LINES. *Petroleum Engr.*, 23, D-26, 28-30 (1951) June.

Barium sulfate, due to its greater specific gravity, is used as aggregate instead of sand and gravel in the production of cement coatings for pipe lines. These coatings are usually used when a negative buoyancy is required such as in marshy areas, swamps, and open water. Sev-

eral successful methods of application are discussed. B. E. Hunt

Corrosion

Chatenever, A. CORROSION FUNDAMENTALS IN FIELD APPLICATION. *World Oil*, 133, 194, 196, 198, 200 (1951) July 1.

The importance of understanding the basic theory of corrosion mechanisms is stressed. The various theories which have been developed are described. Modern theory of corrosion action is based upon the theories of electro chemistry.

B. E. Hunt

Effinger, R. T., Renquist, M. L., Wachter, A. G. and Wilson, J. G. HOW HYDROGEN ATTACKS AND DAMAGES STEEL . . . IN REFINERY EQUIPMENT. *Oil Gas J.*, 50, 99, 100, 103-118 (1951) May 17.

The mechanism of the hydrogen attacks on steel is believed to be dependent upon the diffusion into the steel of atomic hydrogen produced at the steel surface by an electrolytic corrosion-cell. The atomic hydrogen then collects at weak points within the metal resulting in blistering, fissuring, and a loss of ductility. Metallurgical factors are too numerous to be considered but environmental factors are reported. Actual plant experiences are reported.

B. E. Hunt

Evans, U. R. STRESS CORROSION: ITS RELATION TO OTHER TYPES OF CORROSION. *Corrosion* 7, 238 (1951) July.

The various types of corrosion are classified as general, pitting, general intergranular, stress corrosion, and corrosion fatigue. Theories describing the attack in each of these classes are discussed. Particular attention is given to the subject of stress corrosion.

B. E. Hunt

Holness, H. and Ross, T. K. STUDIES IN THE CORROSION OF METALS OCCASIONED BY AQUEOUS SOLUTIONS OF SOME SURFACE-ACTIVE AGENTS. I. COPPER. *J. Applied Chem.* (British) 1, 158-169 (1951) April.

Laboratory studies of the corrosion of copper in aqueous solutions of anionic, cationic, and non-ionic surface-active agents are reported. A theory explaining these results is presented.

B. E. Hunt

McGraw, C. CORROSION CONTROL FOR A NEW GAS TRANSMISSION LINE SYSTEM. *Pipe Line News*, 23, 6-A, 7-A (1951) June.

Some of the principal considerations are discussed which make it possible to make decisions concerning the type of corrosion controls which are necessary and to what extent they need be applied.

B. E. Hunt

Murray, C. A. and Furth, M. A. CORROSION-PREVENTION PROGRAM FOR T.C.C. GAS PLANT. *Oil Gas J.*, 50, 112 (1951) May 24.

Severe corrosion has been experienced in a Thermofor catalytic cracking unit gas plant over several years. Examples are given which illustrate failures and replacements necessary in tubular heat-exchange equipment. A summary is given of a chemical survey to disclose the type of corrosives and the amount of water which produces the corrosion in the system. Ammonia, hydrogen sulfide, and ammonia salts of organic acids are indicated as the principal corrosives present. Corrosion-prevention measures are described which consist of the removal of water with coalescers at appropriate points in the gas plant. A short discussion is given of the benefits to date of the corrosion-prevention measures.

Author's Abstract

Parker, M. E. CORROSION AND ITS CONTROL; MAGNESIUM ANODES FOR "HOT SPOT" PROTECTION: Part 11. *Oil Gas J.*, 50, 136 (1951) May 17.

Data are tabulated for current output and anode life in soils of various resistivities. A systematic procedure for selecting magnesium anodes for "hot spot" protection is given.

B. E. Hunt

Parker, M. E. MAGNESIUM ANODES GROUPS. *Oil Gas J.*: Part 12. 50, 112-114 (1951) May 24.

A partly theoretical and partly empirical treatment of the design of magnesium anode groups is given. B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL—FULL PROTECTION OF COATED LINES WITH MAGNESIUM: Part 13. *Oil Gas J.* 50, 119 (1951) May 31.

The advantages and disadvantages of magne-

sium anodes for cathodic protection are discussed.

B. E. Hunt

Parker, M. E. CURRENT REQUIREMENTS FOR CATHODIC PROTECTION: Part 14. *Oil Gas J.* 50, 85 (1951) June 7.

The current requirements for bare pipe in soil and for steel in fresh water and in salt water are described.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL — CURRENT REQUIREMENTS BY FIELD TEST: Part 15. *Oil Gas J.* 50, 109 (1951) June 14.

The various aspects of field tests made on a buried structure prior to the design of a cathodic protection system are discussed.

B. E. Hunt

Parker, M. E. INSTALLATION AND USE OF TEST LEADS ON PIPE LINES: Part 16. *Oil Gas J.* 50, 339 (1951) June 21.

The installation and use of test leads on pipe lines is discussed.

B. E. Hunt

Parker, M. E. MEASUREMENT OF ELECTRICAL CONSTANTS OF A PIPE LINE: Part 17. *Oil Gas J.*, 50, 94 (1951) June 28.

Two methods of measuring the electrical constants of a buried pipe line are discussed.

B. E. Hunt

Wenk, S. A. and Banta, H. M. A NEW NON-DESTRUCTIVE TEST FOR CORROSION-FATIGUE CRACKS IN DRILL PIPE. *Oil Gas J.* 50, 90-93, (1951) May 17.

A non-destructive test for corrosion-fatigue cracks in drill pipe is described. The method involves the use of a fluorescant magnetic powder and suitable magnetizing equipment. The powder collects at the corrosion cracks which cause flux leakage when the pipe is magnetized.

B. E. Hunt

Zappfe, C. A. and Landgraf, F. E. EMBRITTLING EFFECT OF STEAM ON STAINLESS AT ELEVATED TEMPERATURES. *Eng. Digest* (British), 12, 188 (1951) June.

Laboratory tests are reported which illustrate the effect of steam in the heat-treating furnace on the bendability of certain steels. Causes and cures for this sensitivity are discussed.

B. E. Hunt

CATHODIC PROTECTION TECHNICAL PRACTICES. BULLETIN III. *Corrosion*, 7, 202-209, (1951) June.

This bulletin has been prepared by the Correlating Committee on Cathodic Protection. It describes briefly the fundamentals of the application of cathodic protection and the mitigation of any electrolytic corrosion that may be caused by stray currents from cathodic protection systems.

B. E. Hunt

Pipe

Tyson, J. D. (Assigned to National Tube Company, New Jersey) PIPE-LINE PIPE. U.S. 2,555,256 (1951) May 29.

To avoid the welding difficulties encountered with high yield-strength alloy line-pipe, this invention proposes to weld onto such line-pipe heavier walled end-rings of more readily weldable low-alloy steel. Such end-ring welds are to be properly heat-treated at the pipe mill so that the finished pipe has proper uniform high yield-strength, but is light-walled in the major portion and is suitable for field welding.

O. P. Brysch

CODE FOR PRESSURE PIPING. *Heating, Piping and Air Conditioning*, 23, 92-95 (1951) May.

The 1951 edition of American Standard Code for Pressure Piping reflects the changes in piping practice since 1935. New materials and higher pressure and temperature ratings are covered. In addition to minimum requirements for the different types of piping systems—power, gas and air, oil, district heating, refrigeration—comprehensive requirements are included for fabrication of piping components and systems. The gas industry is interested in the code because it provides realistic minimum construction requirements and offers the basis for a program of self-regulation in matters of safety.

C. L. Tsaros

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